ELECTRICAL TIMES

THURSDAY
28 MAY
1953
NINEPENCE

Westminster Abbey —everywhere!

JUNE THE SECOND . . . and whoever has a radio, has a front seat for a sound-picture of the Coronation.

Thus the Abbey Ceremony will come to millions throughout the World in one of the most widely beamed broadcasts ever undertaken.

Millions more in Britain and in Europe will watch the spectacle by television.

BICC are proud to be associated with the means of bringing this historic event to so many people. Our products play a vital part in the field of telecommunications—from powerful transmitting towers and studio cable-networks, to simple components for the humble portable.

BICC *the World's Largest Cable Manufacturers*

BRITISH INSULATED CALLENDER'S CABLES LIMITED, 21, BLOOMSBURY STREET, LONDON, W.C.1

CUT PRODUCTION COSTS with J. & P. Capacitors

Frequently a substantial and immediate reduction in production costs can be achieved simply by improving the power factor of a factory's electrical installation.
This cannot be done more easily or more reliably than by the use of J. & P. Capacitors.
We will gladly test your installation, free of charge and without obligation, so why not ask us along and learn how much *you* could save by the use of J. & P. Capacitors?

Quick deliveries are assured

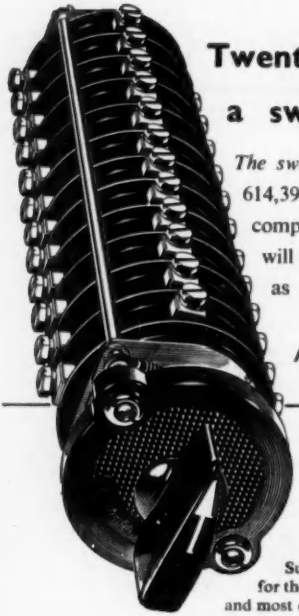
E II R

Loyal Greetings to Her Majesty

from

LAURENCE, SCOTT
&
ELECTROMOTORS
Limited

Makers of Electric Motors since Queen Victoria's reign



Twenty-four 22.5 kVA Circuits on a switch that will lie in your hand

The switch is a 6 cell Austinlite 50. Its 24 pairs of contacts provide 614,390 different switching combinations—which gives some idea of the complexity of the circuiting these switches handle. The smaller A30 will handle up to forty-eight 7.5 kVA circuits—and is as versatile as the A50. Send for illustrated leaflet giving full particulars.

A *Chance* PRODUCT

AUSTINLITE LTD. (A Subsidiary of Chance Brothers Ltd.) Dept. A3
Lighthouse Works, Smethwick 40, Birmingham. West Bromwich 1824
London Office: 28 St. James's Square, S.W.1. Whitehall 6002

Austinlite switches are used and specified by:
The Admiralty; British Electricity Authority; The Air Ministry; Ministry of Supply; British Broadcasting Corporation; General Post Office; Crown Agents for the Colonies; National Physical Laboratory; Royal National Lifeboat Institution, and most of the leading electrical manufacturers in Great Britain.

FLEXIBLE TUBING AND ADAPTORS, CONDUIT BOXES

A New METWAY CATALOGUE
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113 pages of Conduit and Wiring Accessories. Ask for Catalogue No. OHL/31/TE

Please enclose 6d. stamps for postage and apply on Trade heading.

METWAY ELECTRICAL INDUSTRIES LTD.
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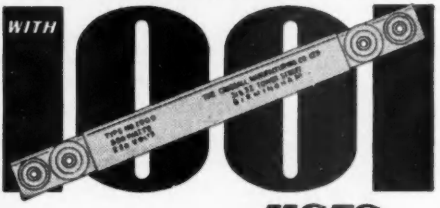
Tel.: Brighton 28366. Grams: Metway, Phone, Brighton

LOCKNUTS, TERMINAL BLOCKS, CHINA CONNECTORS

THE STEEL COVERED HEATER UNIT

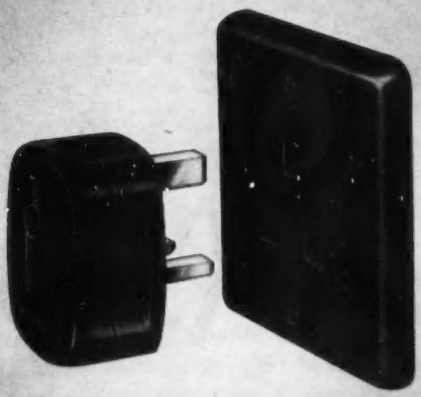
WITH **101** ***USES***



IN its variety of forms, the Cressall steel jacketed unit heater is the solution to most heating problems. Let a Cressall Technical Expert discuss heating with you before you decide. He will be happy to help.

CRESSALL
Registered Trade Name of
THE CRESSALL MANUFACTURING CO LTD
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines)
Telegrams: "OHMIC, Birmingham"

Electrical ACCESSORIES



13 AMP. SOCKET OUTLET FUSED PLUG TO B.S. 1363

DETAILS ON REQUEST

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ASTON LANE · PERRY BARR
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MANCHESTER 3 — H. N. POLLARD, WOOD STREET
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You know the WEE BABY "Belling"...

...only costs £6 . 19 . 6, you know it uses any utensil, works off any power point, you know that it's soundly constructed and vitreous enamelled throughout.
But do you know how well it cooks, and how much it cooks? Just look at this for a meal—

Soup	*Roast Potatoes*
2 lb. Joint of Roast Beef	*Cauliflower, Carrots*
Yorkshire Pudding	*Fruit Pie & Custard*

—all cooked easily and quickly on this marvellous little cooker for less than 2d. (at 1d. per unit). It's just the thing for the small home, with only one or two people (and there are 5½ million such homes in this country, according to the 1951 Census figures).

Only costs £6.19.6!

BELLING & CO. LTD · BRIDGE WORKS · ENFIELD
CRC397

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And they take every plastic hurdle in their stride, as you'll see at the **BRITISH PLASTICS EXHIBITION, STAND A30 (Ground Floor) National Hall, Olympia.** You'll find examples there of outstanding success with—

- *Compression Mouldings, in plastic, ebonite and composition materials.*
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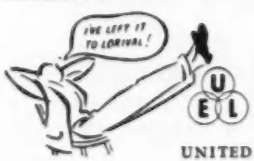
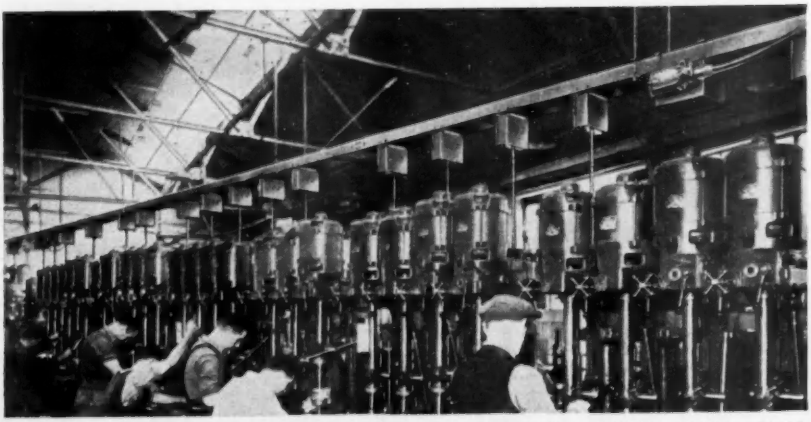
- *Sanitary ware including cisterns, floats, flush pipes and toilet seats.*

Lorival will be pleased to send you their booklet 'The Lorival Plan'—a lively programme of their resources for your information and use.



LORIVAL PLASTICS

UNITED EBONITE & LORIVAL LTD · LITTLE LEVER · NR. BOLTON · LANCS



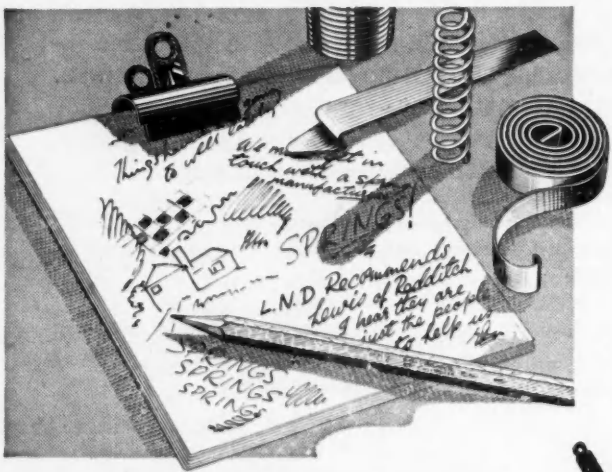
BUSBAR TRUNKING—IDEAL FOR A MACHINE SHOP LIKE THIS

Old electrical installation ideas have given way to BUSBAR TRUNKING —bare copper busbars, sheathed in a steel duct.
BUSBAR TRUNKING is supplied in 12 lengths—easily extended in any direction. Tapping points are provided at intervals of 2 ft. Fused tapping boxes can be plugged in at will, and connections to load completed by short runs of cable in conduit.

For specifications and price, write for Catalogue B.B.T.102.

G. M. ENGINEERING (Ottery St. Mary) LTD.

Sales Office: 1 VICTORIA ST., LONDON, S.W.1 Tel. ABBey 5095



L. N. D. certainly knows what he is talking about. Lewis of Redditch design springs to do just the job you want, and they turn them out from top-quality materials so that they will last as long as your product. It might be worth while to have a word with us, don't you think?

Established 1919. A.I.D. approved.

Manufacturers of Wiremen's Tapes in 30, 60 and 100 feet lengths. At present available from stock.

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GOING IN FOR A LONG INNINGS

ELECTRICAL EQUIPMENT

Crompton

PAPER CABLE

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Telephone: CHAncery 3333 *Telegrams: Crompark, Estrand, London.*

MK 79

MK
M.K. REGD

Price Reductions

MK were the first to make 13 ampere accessories to BS 1363: they are still first choice for quality and value. To meet the increasing demands of the housing drive we have greatly increased our production. Considerable economies have been made and these are being passed on to our friends in the form of reduced prices. MK quality is now higher than ever and the new prices represent the most outstanding value today.

THESE ARE THE NEW 13 AMPERE LIST PRICES

List No.	Description	OLD	NEW
SOCKET-OUTLETS & PLUGS		Dozen	
727/646	Surface Insulated, Brown	91/8	**86/-**
	Surface Insulated, White	106/8	**95/8**
728/646	Surface Insulated, Two-Gang, Brown	182/-	**170/-**
	Surface Insulated, Two-Gang, White	—	**188/-**
730/646	Flush Insulated, Brown	91/8	**86/-**
	Flush Insulated, White	106/8	**95/8**
731/646	Flush Insulated, Two-Gang, Brown	177/-	**170/-**
	Flush Insulated, Two-Gang, White	207/-	**188/-**
SWITCHSOCKET-OUTLETS & PLUGS		Each	
2959/646	Surface Insulated, Brown	10/8	**10/-**
	Surface Insulated, White	12/4	**10/10**
2957/646	Flush Insulated, Brown	10/8	**10/-**
	Flush Insulated, White	12/4	**10/10**
FUSED-PLUGS		Dozen	
646	B.S. 1363:1947 Brown	42/-	**40/-**
	B.S. 1363:1947 White	48/4	**44/-**

The new prices are subject to the standard Trade Discount and will be applied to all goods despatched from our Works on and after

1st MAY 1953

The restrictions on non-ferrous metals have been removed and our new designs with brass frontplates finished BMA are now reinstated, with the exception of pilot-lamp switchsocket-outlets.

M.K. ELECTRIC LTD. LONDON N.18 Tel: TOTtenham 5151

Heralding a new era in our History

Loyal Greetings

to

HER MAJESTY
QUEEN ELIZABETH II

VENNER LIMITED
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NEW MALDEN, SURREY
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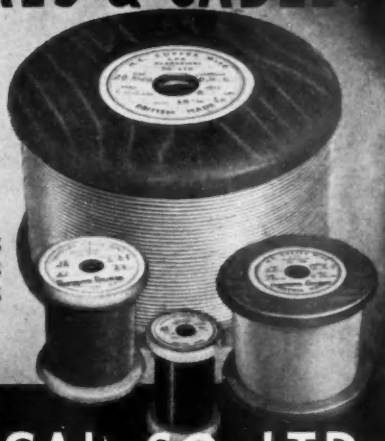
Insulated WIRES & CABLES

LPS

INSTRUMENT WIRES · STRANDS & BRAIDS
TELEPHONE & RADIO CORDS & CABLES
RESISTANCE WIRES · P.V.C. TUBINGS



L.P.S. ELECTRICAL CO. LTD
ALPERTON · WEMBLEY · MIDDLESEX
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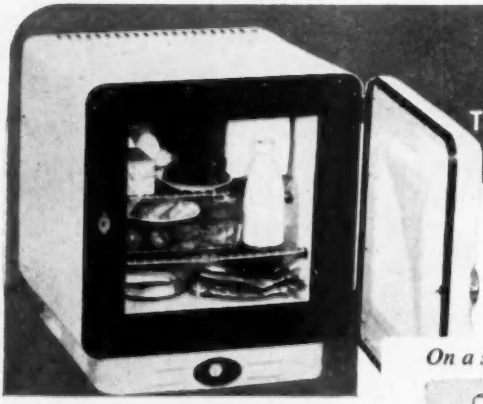
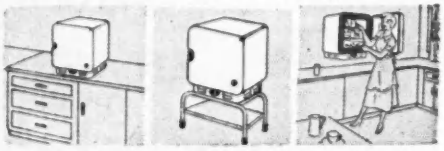


"Astral"
THE SMALL REFRIGERATOR WITH THE BIG MARKET

The Astral brings refrigeration within the means of new millions. It is reasonably priced, small enough for the tiniest kitchen, yet big enough to store all the perishable food for the average-sized family. This Scottish-made refrigerator has swept America and Canada. National advertising is creating demand now in this country.

Silent, motorless, no interference with Radio or TV. Guaranteed for two years. Measures 24½ in. high by 21¼ in. wide by 22½ in. deep.

On a shelf . . . on a stand . . . 'hung' on a wall



Astral REFRIGERATORS

. . . designed for the smaller kitchen

ASTRAL EQUIPMENT LTD., 96 BUCHANAN ST., GLASGOW, C.1.

INSIST ON **Grubb** HEATING UNITS

GUARANTEED FOR TWO YEARS

ALL ELECTRIC

Immersion Heaters and Circulators

LOADINGS AVAILABLE
2, 3 AND 4kW

THE 7 KW MODEL
(TAX FREE)
with INTERMEDIATE RATINGS
NOW AVAILABLE

Advantages of the GRUBB Domestic Water Heater with Thermostatic Control:

(1) AUTOMATIC HOT WATER SUPPLY. (2) SAVES SOLID FUEL WORRIES. (3) MINIMUM ELECTRICITY CONSUMPTION.

Supplied in all sizes from 12" to 42"

A GRUBB QUALITY PRODUCT

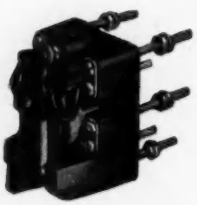
STOP PRESS:
The New 1,000 watt RADIATOR Model now available.
Supplied with Silent Dome Feet or with Castors.

Write today for Price Lists, Brochures and Trade Terms to Sole Manufacturers

GRUBB ENGINEERING COMPANY LTD.
BIRMINGHAM 12 **Export Enquiries Invited**

RELAYS

by



ARROW

THE relay is an outstanding example of the sound mechanical and electrical design which has characterized ARROW products for so long. Every relay is individually produced and tested to give long and *silent* service.

Thirty different circuit arrangements are offered with contact ratings up to 440 v. AC. Operating coils range from 6 to 550 volts.

ARROW relays are available for surface and back of panel wiring or enclosed as illustrated.

Write ***NOW*** *for full details.*

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LONDON · W.5
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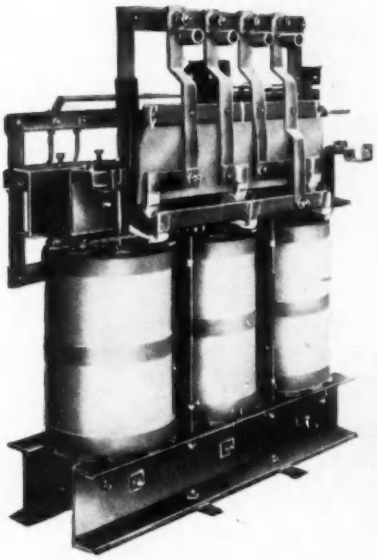
ARROW ELECTRIC SWITCHES LTD

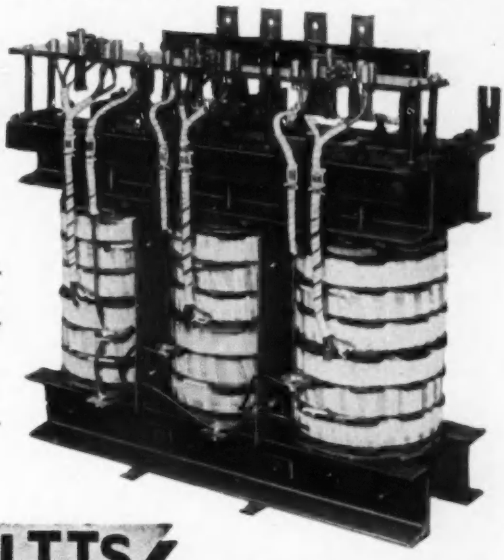
LINDLEY THOMPSON *Core Type* TRANSFORMERS

Nothing has been overlooked in the manufacture of these Core Type Transformers. Winding, cooling, insulation, drying . . . every factor which makes for the utmost efficiency has been considered.

The functions and characteristic features of these Units are fully described in the Brochure of the LINDLEY THOMPSON TRANSFORMER & SERVICE CO. LTD. A copy will gladly be sent to any Electrical Engineer or Executive who requests it.



600 kVA, 3-phase, 50 cycles.
Voltage ratio 6,600-433.
With off-load tapping switch.



100 kVA, 3-phase, 50 cycles.
Voltage ratio 6,600-433.

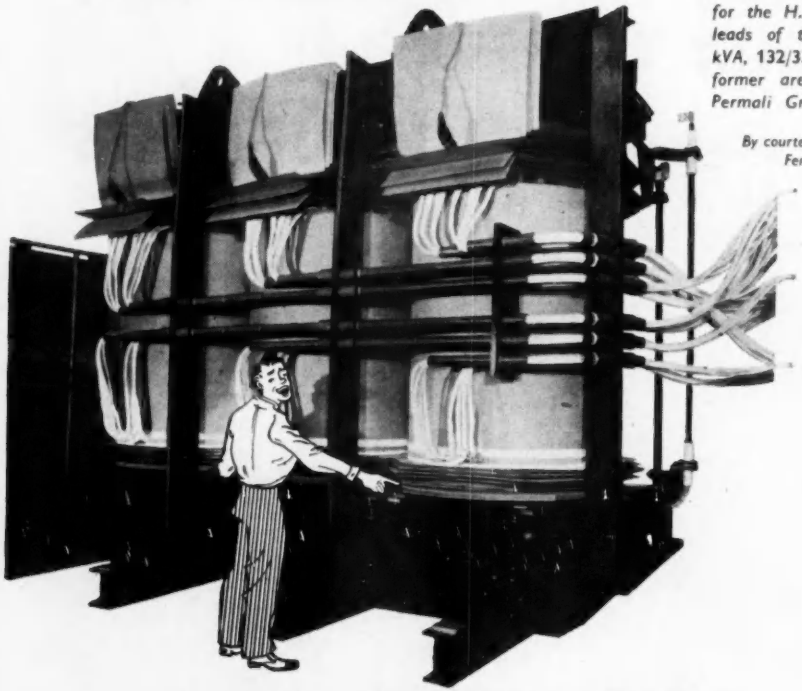
TWO YEARS GUARANTEE WITH ALL TRANSFORMERS

THE LINDLEY THOMPSON TRANSFORMER & SERVICE CO. LTD.
ST. MARY'S ROAD MIDDLE GREEN SLOUGH · BUCKS

where **STRENGTH** is vital

The upper and lower coil clamping plates and the cleat supports for the H.V. Tapping leads of this 30,000 kVA, 132/33 kV transformer are made of Permali Grade EH67.

By courtesy of Messrs Ferranti Limited



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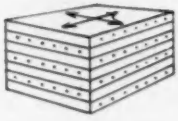
PERMALI



All "Permali" parts have strength "built-in" as required by suitable arrangements of fibre direction during manufacture. TYPE 6 PERMALI, for instance, has the grain of adjacent laminations at right angles and is specially suitable for components needing high compressive strength and rigidity.

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Tel.: Abbey 6494

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270 *Corporation Street*
Tel.: Central 5584

MANCHESTER (3)
196 *Deansgate*
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LAMINATES FOR ELECTRICAL INSULATING AND GENERAL ENGINEERING USES—RAIL TRACK INSULATION STAY-WIRE INSULATORS. S.R.B.P. TUBES, H.V. BUSHINGS AND TERMINALS

23197

Ministry of Agriculture and Fisheries, Whitehall Place, London, S.W.1
Architect:
Clifford E. Mee, A.R.I.B.A.
Chief Architect's Division
Ministry of Works

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

for the *new* House of Commons

The provision of emergency lighting equipment in the new House of Commons was entrusted to Chloride Batteries Limited. A 240-volt battery of 122 DBG6 Chloride Planté sealed-in type cells (*capacity* 180 *ampere-hours at the* 10 *hour rate of discharge and capable of maintaining a load of* 10 *kW for* 3 *hours*) has been installed with a special maintained type Keepalite Automatic Emergency Lighting equipment. The battery is kept in a fully charged condition by trickle-charging and is instantaneously brought into use by the Keepalite equipment on an interruption of the mains supply. Another Chloride Planté battery of 25 ASG2 sealed-in type cells (capacity 20 ampere-hours) has been provided to operate the electric clock system in the House.

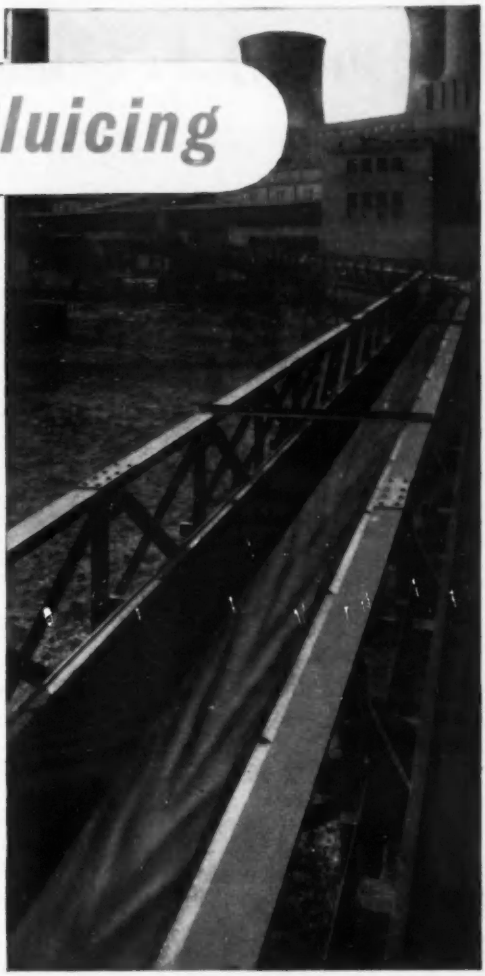
These batteries were installed with the approval of the Ministry of Works.

A PRODUCT OF CHLORIDE BATTERIES LIMITED

Exide Works · Clifton Junction · Swinton · Manchester and Grosvenor Gardens House · Grosvenor Gardens · London · SW1

MAKERS OF EXIDE BATTERIES 5.62

Gravity Sluicing



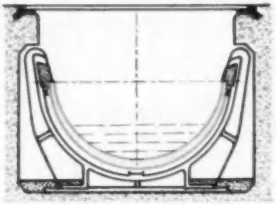
removes

ASH...DUST...GRITS

Gravity sluicing is an extremely simple and efficient system of removing ash, dust and grits from stoker-fired or pulverised fuel-fired boiler plant. Operating and maintenance costs are low, and there are few working parts in contact with the materials conveyed.

The system is readily adaptable to any site conditions and layout of boilers. Combustion chamber ash, dust and grits may be discharged directly into a sluice and conveyed by the gravity flow of water to a sump or swirl pit.

This installation at a large Power Station has for more than 10 years handled ash, dust and grits from twelve ICL 320,000 lbs./hr. pulverised fuel-fired boilers, at the rate of 500 tons per day. The mixture is conveyed by gravity sluices to a swirl pit and thence to the disposal ground by means of the gravity flow launder shown in the foreground.



This section through the sluice inside the boiler house, shows the renewable alloy liner plates along which ash, dust and grits are conveyed by the gravity flow of water.

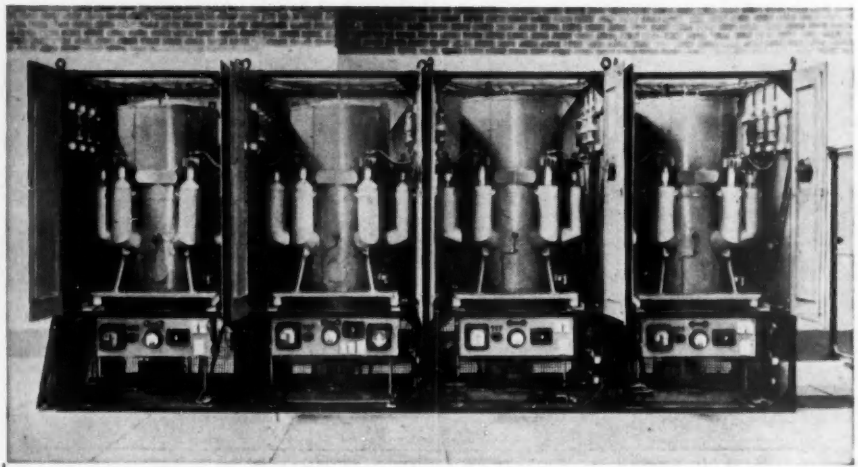
ICL

INTERNATIONAL COMBUSTION LIMITED

London Office : Nineteen Woburn Place, W.C.1

WORKS: DERBY, ENGLAND; PORT ELIZABETH, SOUTH AFRICA; SYDNEY, AUSTRALIA

Mercury-arc rectifiers in Australia



The ENGLISH ELECTRIC Company has recently installed four air-cooled, sealed, steel-tank rectifiers at the Commonwealth Rolling Mills of Lysaghts Works (Pty) Ltd., Port Kembla, New South Wales, Australia.

The rectifiers provide auxiliary D.C. power for the new 80 in. reversing mill, 2-high temper mill train (390 h.p.), cranes, normalizer drive, roll grinders and small mill-type motors.

Each rectifier is rated at 250 kW, 250 volts.

'ENGLISH ELECTRIC'

mercury-arc rectifiers

THE ENGLISH ELECTRIC COMPANY LTD., Queens House, Kingsway, London, W.C.2

Rectifier Substation Department, Stafford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

RMA.6

Absolute reliability

Service . . . . . .

Consistent quality .

Maximum satisfaction

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MONMORE CONDUITS LTD.
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Comprising:
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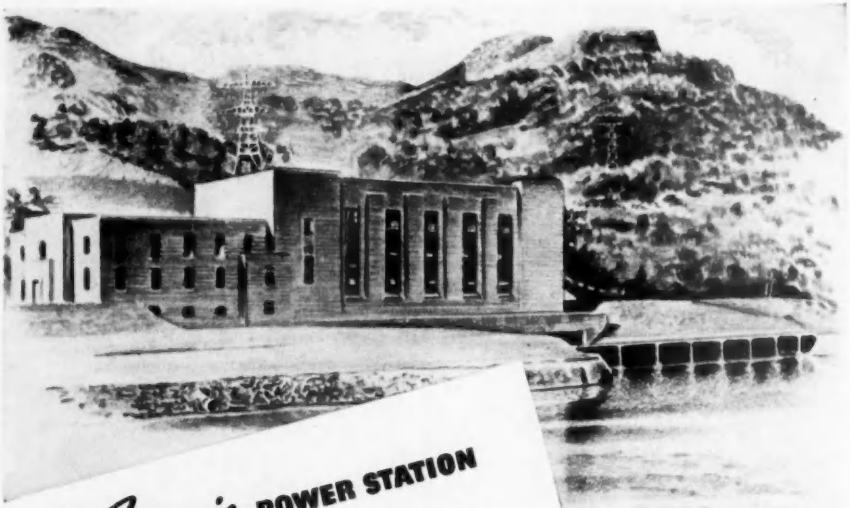
Simplex Conduits Ltd.
Stella Conduit Co. Ltd.
STEEL TUBE & CONDUIT CO. (Middlesbrough) LTD.
TALBOT-STEAD TUBE CO. LTD.
WALSALL CONDUITS LTD.

MADE IN ENGLAND
APPROVED & CERTIFIED
A.S.C.M
BRITISH STANDARD

Advertisement of the
ASSOCIATION OF STEEL CONDUIT MANUFACTURERS
21, WATERLOO ST · BIRMINGHAM



Clunie **POWER STATION**

THIS IS ONE OF THE STATIONS OF THE TUMMEL-GARRY SCHEME IN PERTHSHIRE. IT HAS A PLANT CAPACITY OF 61,200 KW WITH AN ESTIMATED AVERAGE ANNUAL OUTPUT OF 143,000,000 KW HOURS. THE THREE SETS OF VERTICAL FRANCIS TURBO-ALTERNATORS WORK UNDER A GROSS HEAD OF 173 FEET OF WATER AND ARE FED FROM A CATCHMENT AREA OF 515 SQUARE MILES.

SIEMENS

V.I.R

CABLES

carry the load

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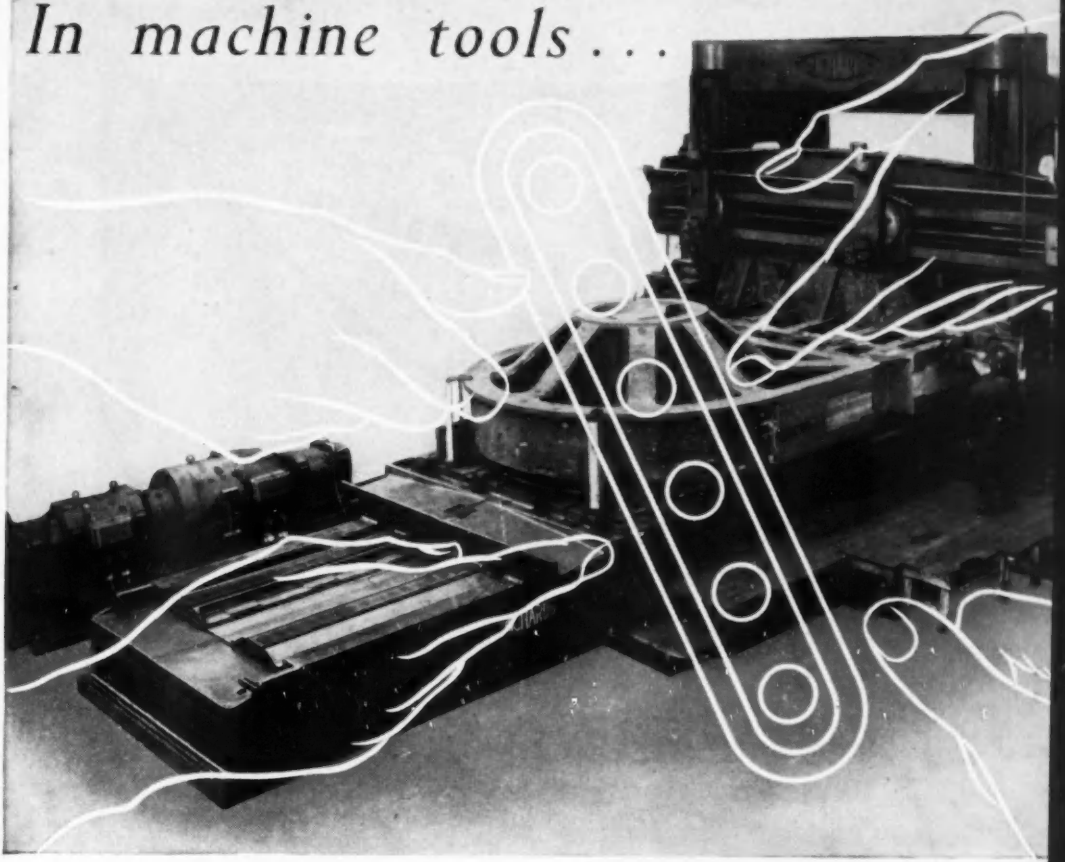

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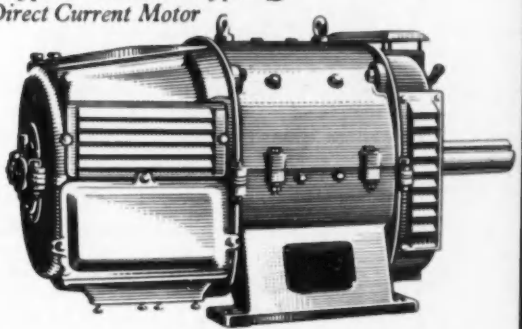

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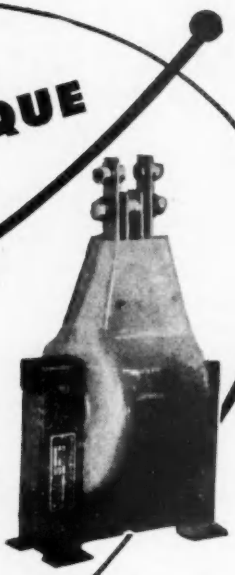

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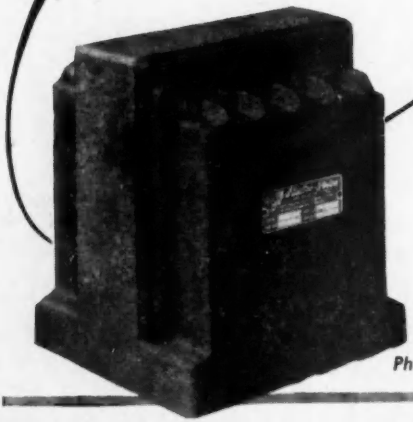

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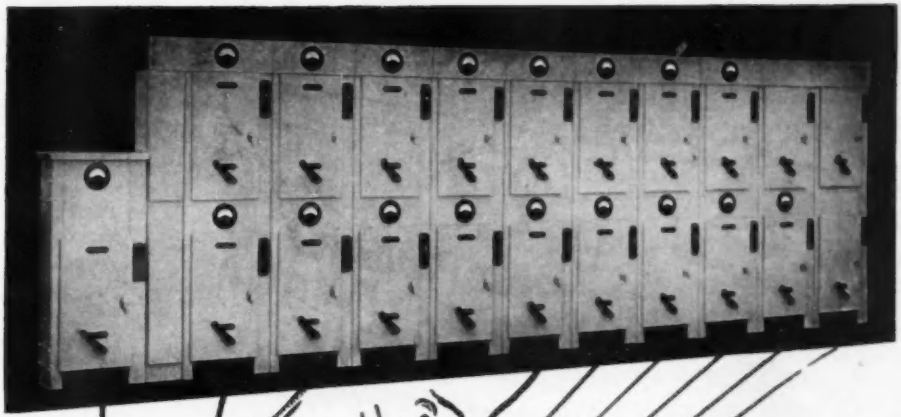

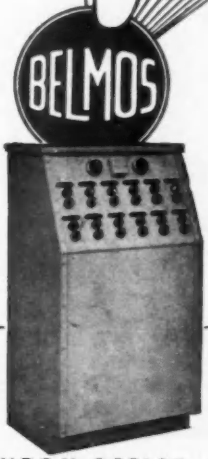

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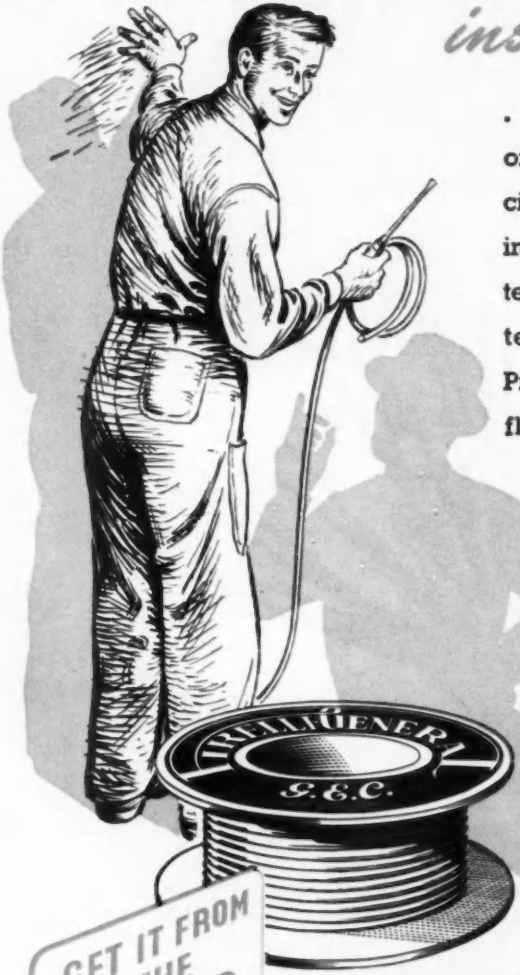

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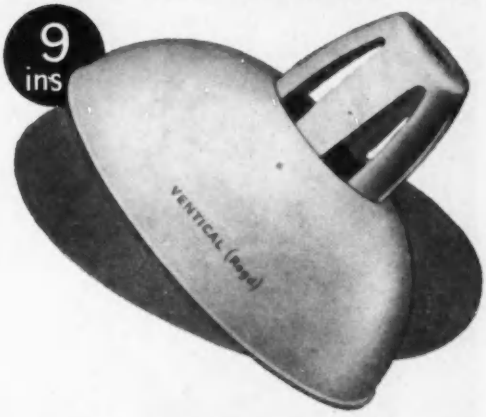

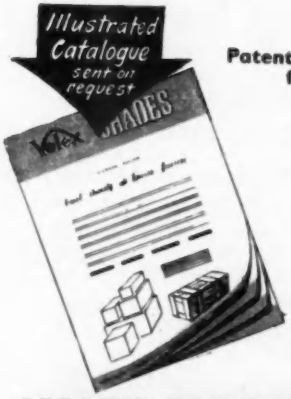

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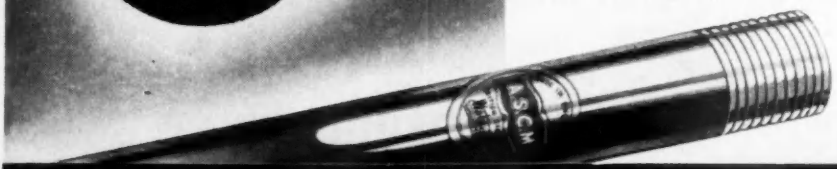

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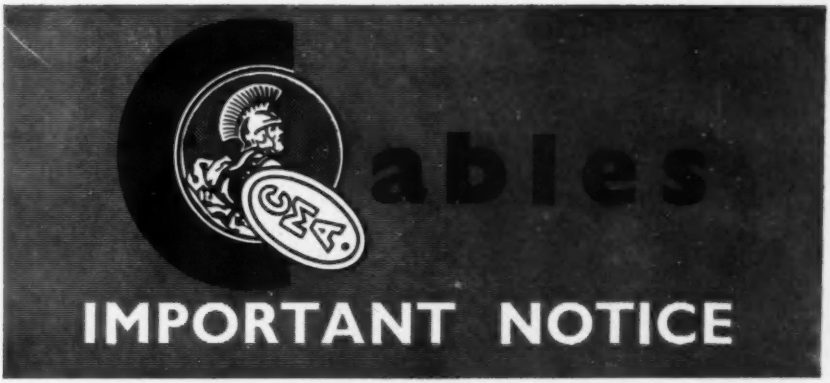

REVISION OF B.S.7—1946

A revised edition of B.S.7—Rubber Insulated Cables and Flexible Cords for Power and Lighting Purposes—will shortly be issued by the British Standards Institution, as also will a new British Standard Specification for P.V.C. Insulated Cables for generally similar purposes, which supersedes the supplement previously included in B.S.7.

These specifications differ from B.S.7 1946 in a number of respects of which the most important are the changes in thicknesses of insulation for the 250 volt cables, and the adoption of more rational sheath thicknesses. These changes which in the main result in reductions, have only been made after most careful consideration by, and have the support of, not only the C.M.A. but also representatives of many user organisations, as they were the subject of unanimous agreement when under consideration by the British Standards Institution.

The changes in dimensions are the most impressive parts of the new specification, and in addition to the reductions in thicknesses of insulation for 250 volt cables, uniform thicknesses have been adopted for tough rubber, P.V.C. and lead sheathings in the lower diameter ranges, so that cables having these types of sheathing within the prescribed range will have common overall dimensions. There are other changes of interest to buyers and users, particularly the inclusion of additional types of cables such as H.S.O.S. cables, T.R.S. cables with semi-embedded braid and Figure 8 flexible cords.

The new types of cable, along with other changes in the specification, have the approval of the I.E.E., with certain exceptions which are indicated in the specification.

As this revision of B.S.7 involves modified insulation thicknesses for cables which are also specified in other British Standards, particularly B.S.883 for shipwiring cables and vulcanised rubber insulated wire armoured cables for collieries, it is proposed that these standards should be published at the same time as B.S.7.—1953.

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Two more pages from the REVO Album . . . .

(left) *Revo "Festival" lanterns and columns have already been installed by numerous important towns, and the striking effect obtained from these units is apparent in this photograph of Weymouth Esplanade.*

By courtesy of F. H. CLINCH, Esq., B.Sc., A.M.I.C.E., Chartered Civil Engineer, Borough Engineer and Surveyor of Weymouth and Melcombe Regis.

Revo "Festival" lanterns are designed for 5ft. Fluorescent Tubular lamps.

(right) *Another example of Revo "Festival" lanterns on Revo "Scopas" concrete columns erected on an island site at Dudley.*

By courtesy of F. H. GIBBONS, Esq., O.B.E., M.I.Mun.E., Borough Engineer of Dudley.

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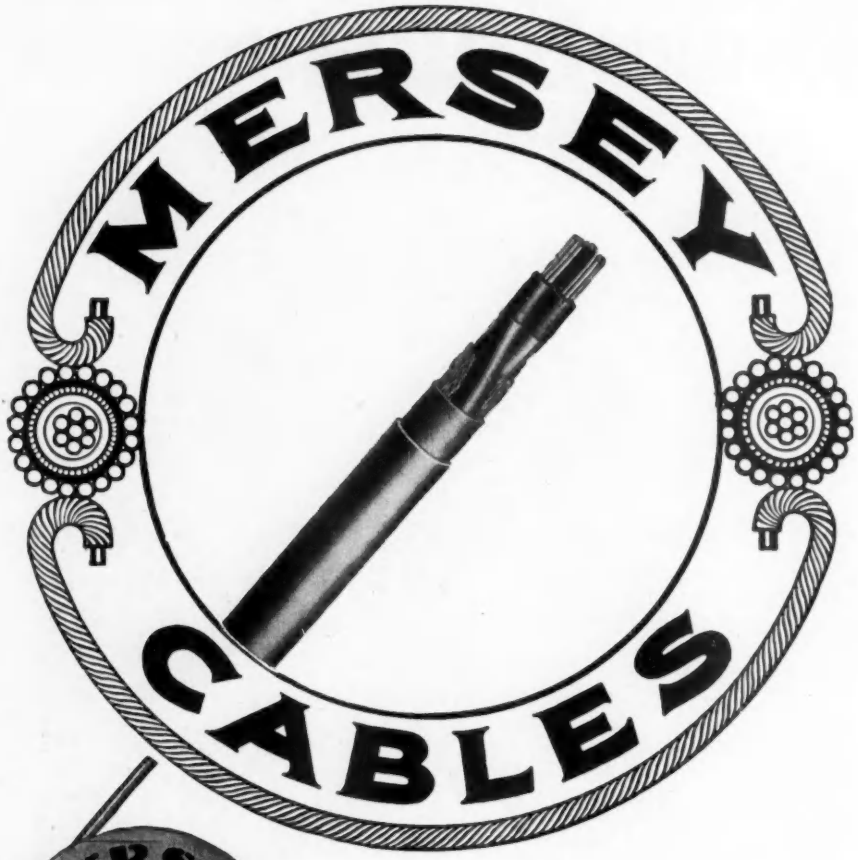

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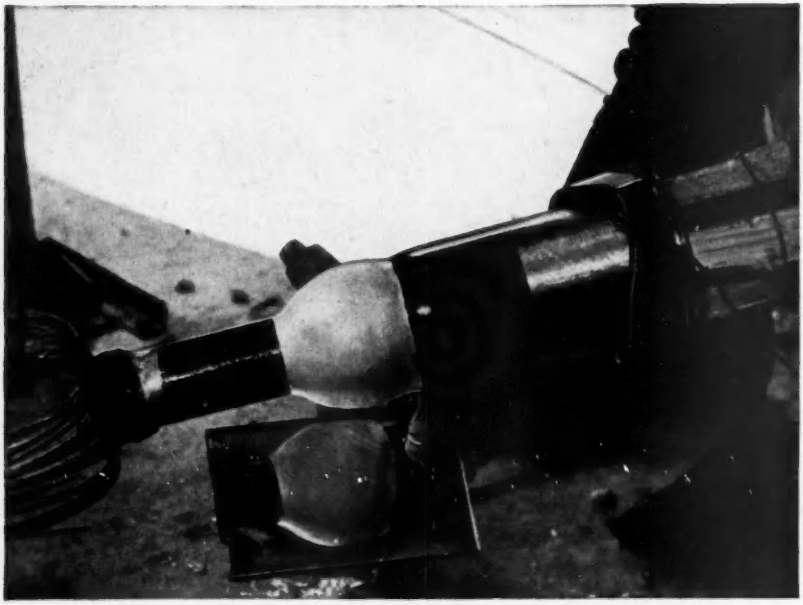

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Inspecting a finished wipe on an 0.25 sq. in. 33 K.V. cable.

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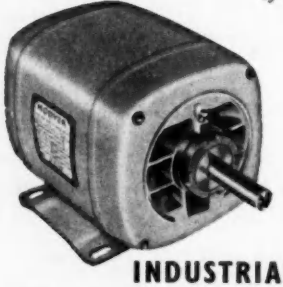

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Editorial

LIGHTS AT HOME

GOOD lighting standards are becoming increasingly appreciated in industry, but the workman who will demand them at his bench is strangely uncritical of the ineffective arrangements he finds at home. At the factory, poor lighting will slow down work and increase the chance of accidents. Speed may not be so important at home, but an injury is quite as unwelcome there; and according to a thought-provoking Home Office report, bad lighting is indeed a significant factor in the surprisingly high number of fatal accidents which occur each year in houses and flats. In corridors and in stairways, in particular, an ample level of illumination is a valuable insurance against mishap, and it is one to which those responsible for planning today's houses might well pay more attention. Besides providing for good lighting, they must facilitate its use: the most efficient installation is of little value if a misguided sense of saving has omitted, two-way switching, so that the stairway is left in shadow. Many considerations besides safety support the advocate of good lighting, but accidents have a special claim on the attention, and the chance of avoiding the distress they cause is worth a few more shillings in the total cost of equipping and running a house.

THE SELLING TASK

THERE has grown up between the competing fuel industries a delightful courtesy of keeping each other informed of their activities, with invitations to meetings, and even the occasional celebration. Even though *Meteor* has been outspoken on matters affecting solid fuel, none the less the Coal Utilisation Council has been kind enough to send us their report for 1952. It is clear that this year marked the conclusion of the initial phase of building up the activities of the Council. They completed the first full year of national advertising, the showroom scheme was firmly established, and the three-year planned expansion achieved. Let us pay tribute to a fine effort in publicity. Let us also learn from our competitors the major task which confronts us in restoring the case for electricity to its former position; in recovering the ground that has been lost in the last few years. The solid fuel interests have now an established position; they will be so much the harder to assail, but against this and against gas, electricity has the best selling story. In the past the industry has perhaps had too easy a task in the ready way it has been accepted by the public. That time is over. We shall now have to fight for load. There is every sign that the industry is awakening from the recumbent attitude of the past few years, but we are far from the position shown by the Coal Utilisation Council's report.

SEARCH FOR SIMPLICITY

YEAR by year, the Comptroller-General of Patents obtains an unrivalled view of technical development in its early stages. In his annual report, he summarises succinctly the trends of invention that thirty thousand and more patent applications have made apparent, and usually he finds some new movement afoot in the fertile field of electrical engineering. To judge from his comments, the industry's theme during 1952 was simplicity: there is about its developments an apparent revulsion from complication, a searching after simpler things. The complexities of the valve are giving way to the relatively simpler structures of the transistor and the magnetic amplifier; the complicated plumbing of the tubular waveguide is left behind as today's inventors—and how dated that term now sounds!—show interest in enamelled wires, or wires with specially

roughened surfaces, as a means of carrying high frequency energy; even signalling systems are benefiting from the mathematical researches into information theory, and shorter and simpler ways of passing on knowledge are appearing. Simplicity is indeed the keynote of these developments, and a most healthy sign it is in electrical engineering. In our technology, construction has often followed the necessarily complicated path mapped out by theory, and the simplicity that the empirical approach can bring is frequently lacking.

MANAGING MAINTENANCE

CHOICE by the Incorporated Plant Engineers of "Management" as the theme of their annual conference shows a welcome awareness of an important difficulty that affects maintenance departments in every industry. Since the maintenance engineer has to be above all else a practical man, the importance of his organising ability is liable to be discounted. In their admiration for his ability to get machines working after a breakdown, his seniors may neglect to give him the authority that could ensure that no breakdown in fact occurred. To set matters aright, as Mr. J. C. Veale stressed in his Presidential Address, the maintenance engineer needs both to manage his men and also to successfully influence those senior to him, so far as plant matters are concerned; this latter may be a less simple proposition. Yet only in this way can he gain in his own right, the status that will enable him to carry out the techniques of planned and preventative maintenance which look so simple on paper, but which often excite initial obstruction from production departments, who think mainly of today and sometimes show a regrettable tendency to let tomorrow look after itself.

COMMISSIONED SPEED

THERE can be no doubt that any industry referred to the Monopolies Commission for investigation must face an expensive time. Just how costly the procedure is likely to prove is incalculable, for the staff involved are largely diverted from other duties. However, the Select Committee on Estimates which has been studying the workings of the Commission puts the figure in the region of £20,000, which is alarming enough. Moreover, to this direct burden must be added the effect an investigation in progress has on customers and on the general public. Any step towards reducing the time taken for an enquiry to be completed should react favourably on both of these costs. The Select Committee's recommendation that the Board of Trade and the Commission should consider the evolution of swifter methods of working as a matter of urgency is both timely and welcome. It is to be hoped that it will be acted upon promptly and with vigour.

GAS UNDERGROUND

LAST week's announcement that the Gas Council intends to finance extensive exploration for natural gas reserves initiates a project which will require the close attention of the electricity industry. Experience abroad, and especially in America, has shown that plentiful supplies of natural gas give a low-cost fuel. Though the discovery of substantial reserves would unquestionably prove a national asset of the first importance, it could not fail to have a modifying effect on the future expansion of electricity demand, especially in relation to the domestic heating and cooking loads which are so important to the economics of supply. There is, obviously, no likelihood of a sudden change in conditions, and indeed, there is an air of desperation rather than confidence about the whole plan for exploration. The gas industry realises that the rising cost of coal is pricing it out of competition, while its demands for specialised grades of fuel are proving difficult in an age of mechanised mining, and are limiting what opportunity for expansion exists. Natural gas would prove a blessing to the gas industry, but the intriguing possibility does exist that if a dirty supply of poor calorific value is tapped, it may be suitable only for electricity generation.

Meteor

MAKING THE MOST OF DISTRIBUTION PLANT

The Problem of short-term thermal limitations in cables, current and voltage transformers and distribution transformers is considered in this article

By S. R. MELLONIE, M.I.E.E., A.Amer.I.E.E.

THE problem of the peak load demand has been with the Supply Industry since its earliest days, and one method of obtaining assistance is to take advantage of the cyclic rating of the distribution plant. The measures taken to obtain maximum output from equipment may usefully be considered in three groups:—

(1) Allowance for ambient temperature below the design figures, i.e. seasonal rating.

(2) Operation at temperature above design limits with resultant reduction of life.

(3) Cyclic rating of components.

Method 1 has been practised for many years in this country, and method 2 is also widely used, particularly in America where the Standards Association has issued a guide to the loading of transformers (A.S.A. C.57.32). This article is chiefly concerned with the use of method 3, and the limitations imposed by the character of the several components of the plant.

In addition to the effect on insulating materials a further limitation is imposed by the mechanical effects of temperature rise, this is, of course, of practical importance in connection with the expansion and contraction of cable sheaths and cores.

Against such considerations must be placed the fact that cables are subjected to such cyclic changes day after day for many years, and while failures are not unknown, the cost of damage due to this cause is negligible. Further, all cables are liable to carry heavy fault currents which may cause rapid rise of temperature resulting in comparatively sudden expansion, hence the higher loads permissible in cyclic rating should not cause undue distress and, although the rate of failure may be slightly increased, yet on balance the maximum use of system capacity thus achieved is economically sound.

Major Components

Of the three major components of distribution plant, i.e. cables, transformers and switchgear, the published information relating to cyclic rating is scanty, except for transformers. Tables of thermal time constants and permissible overload in certain conditions are included in B.S.S. 171 but apart from E.R.A. Reports no comparable figures are easily available for cables and may be said to be non-existent for switchgear.

The specifications covering switchgear rarely provide for any over-current capacity, but this does not rule out the use of any cyclic rating which may exist as an inherent feature of any apparatus where temperature rise is the limiting factor. However, it is not usually the insulation which is damaged by excessive temperature but oxidation of the contacts and joints is often the major consideration. The reason for this is that the cycle of heating and cooling is cumulative in its effect and may lead to serious trouble. Liberally rated switchgear is a sound investment, particularly if the full load rating is 600 amps or above, and so far as the distribution plant as a whole is concerned, the only practical procedure is to check that the switchgear has at least the same cyclic rating as the other components and ensure that maintenance is effective in controlling deterioration due to temperature rise. The use of silver reinforced contacts is of great assistance in this connection. It is sometimes possible to up-rate a major section of the distribution system by eliminating switchgear components which prevent the use of the full capacity of the other items of plant.

Current transformers which are included in most switchgear units will often prove troublesome owing to the low thermal constant. On the other hand, the bar type single turn primary is usually able to withstand over-currents of greater magnitude than the associated equip-

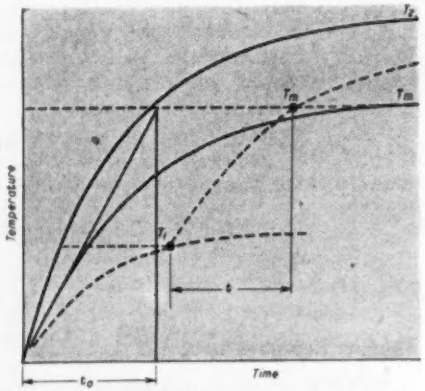


Fig. 1. Curves of normal and overload conditions to show temperature rise

ment. The secondary windings will, of course, be subjected to the same magnitude of overcurrent, but as the secondary winding is usually distributed over a considerable surface the normal temperature rise is usually below the design limits.

A typical C.T. with a ratio of 100/5 for use on a 6·6 kV system where the fault level is 150 MVA would be designed with an overcurrent factor of 130 and, on the basis of one second rating would have a primary winding with a cross section of copper of 0·125 sq. in., hence in such cases there is ample capacity for cyclic rating.

Many transformers with 5 amp. secondary are wound with 14 gauge copper which will in most cases carry 200% load continuously, and it may be taken that the limitation imposed by modern C.T's is not likely to prevent the maximum utilisation of cable or transformers.

Determination of Cyclic Rating

The factor limiting the output of nearly all classes of electrical apparatus is the temperature rise imposed by the insulating material in common use. The general form of the curve connecting temperature rise and time is well known and its theoretical properties have been included in many text-books during the last 30 years, but there still remains a class of problem related to permissible loading of items of plant under practical cyclic conditions for which data is not easily found. It is true that figures for the rating of cables for a limited time after carrying an initial load below normal rating have been published, and, as mentioned above, certain figures are available for transformers. However, such figures bear little relation to operating conditions and it is to assist those responsible for making rapid decisions of this kind that the following notes and curves have been prepared.

The physical picture can be visualised by referring to Fig. 1 in which the full curve marked T_m relates to the normal load conditions producing the maximum allowable temperature T_m. The dotted curve T_1 shows the rise of temperature due to a smaller initial load and the curve T_2 shows the rise due to the overload which, if maintained beyond a certain time would damage insulation.

The relationship between these quantities is expressed by the equation—

$$T = T_m(1-a) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where $a = \dfrac{1}{e^{\frac{t}{t_o}}}$ T is the temperature rise after a time t hours and t_o is the thermal time constant.

Referring again to Fig. 1, the condition to be met is that, starting with an initial temperature T_1 then if the load is suddenly increased to a value which if maintained would produce T_2 then as T_m must not be exceeded we have

$$T_m = T_1 + (T_2 - T_1)(1-a)$$

Let $T_1 = nT_m$

Then $1-a = \dfrac{T_m - nT_m}{T_2 - nT_m} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$

Substituting the value for 'a' from equation 1, this leads to

$$t = \frac{t_o}{0{\cdot}43} \log \left[\frac{1}{1 - \dfrac{1-n}{T_2/T_m - n}} \right] \quad \ldots\ldots (3)$$

From this it is important to note that the time the overload can be safely carried is directly proportional to the thermal time constant of the apparatus.

If T_1 is zero, equation 3 reduces to:

$$t = t_o \log_e \left[\frac{T_2/T_m}{T_2/T_n - 1} \right] \quad \ldots\ldots\ldots\ldots (4)$$

These expressions are cumbersome to use, but when the assumption is made that the temperature rise is proportional to the square of the load i.e. by writing

$$\frac{T_2}{T_m} = \left[\frac{L_2}{L_m} \right]^2$$

then curves may be drawn as in Fig. 2 which enable rapid readings to be obtained for cyclic loading conditions. The curves are drawn for a thermal time constant of one hour and as the values of the time constant varies for different sizes and classes of apparatus it is necessary to use a correction factor.

In Fig. 2 the ordinates represent the initial load as a percentage of the basic load, i.e.

$L_1/L_m \times 100$. The curve marked 1·05 refers to a 5% overload, i.e. $L_2 = 1{\cdot}05\ L_m$ and the curve marked 2·0 refers to 100% overload, i.e. $L_2 = 2\ L_m$.

So far as the author is aware these curves have not been published in this form before and in this connection would acknowledge the exposition by E. Oelschlager published in the *E.T.Z.* in 1900.

Referring again to Equation 4, and substituting the values for L_2 and L_m we obtain

$$t_o = \frac{t}{\log_e\left[1 - \frac{1}{(L_2/L_m)^2}\right]} \quad \ldots\ldots\ldots\ldots (5)$$

Equation 5 is useful in determining the value of the thermal constant in typical cases where ratio of the permissible overload is known. Thus, applying Equation 5 to the figures given in Table 20 of the I.E.E. Regulations we find that a 0·1 cable has a time constant of 0·4 hours and a 1 sq in. cable has a time constant of $1\frac{1}{2}$ hours. In these cases therefore it would be necessary to multiply the values of time obtained from the curves in Fig. 2 by 0·4 and 1·25 respectively. Typical values of thermal time constants are 1·2 for a 0·25 sq. in. 3-core 6·6 kV PILC cable and 2·2 for a 0·3 sq. in. 3-core 33 kV cable. The value of the time constant of the transformers varies with the size, rating and voltage but for the type O.N. which is the most commonly used in distribution systems the range is comparatively small and excepting high voltage low capacity units can be taken as between 2·25 and 2.

Use of Curves

The curves may be used to determine the equivalent thermal time constant when the ratio L_2/L_m is given, e.g. a cable is rated to carry 40% O.L. for one hour after carrying a load of 50%. From the curve 1·4 it is found that the time this load can be carried after initial loading of 50% is 0·6 hours. As this relates to a time constant of one hour the time constant of the cable must be

$$\frac{1}{0{\cdot}6} = 1{\cdot}66 \text{ hours.}$$

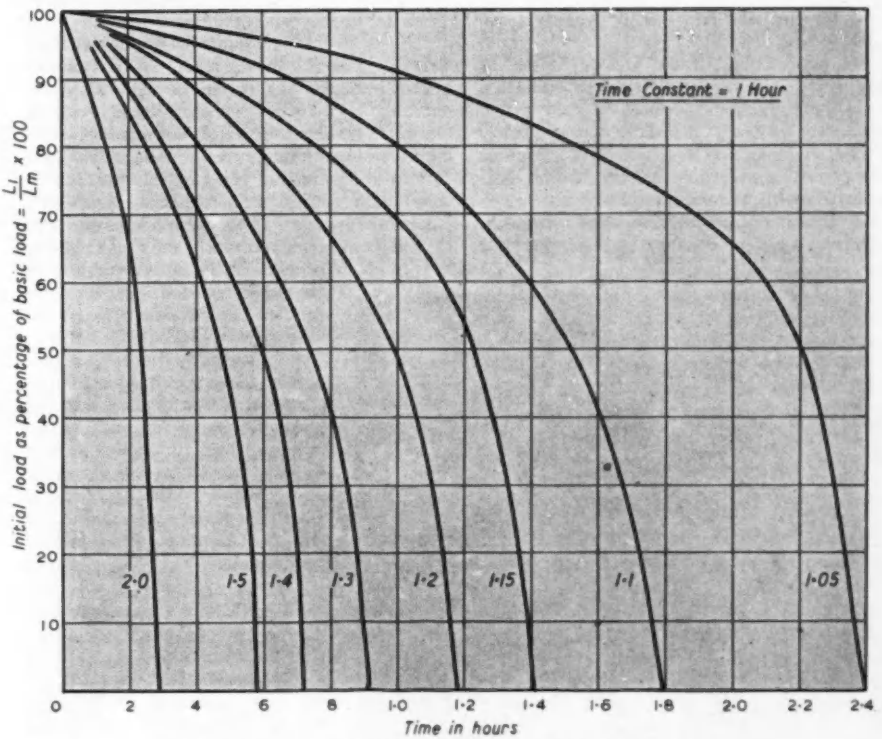


Fig. 2. Curves for determining the equivalent thermal constant

It is instructive to compare the results obtained from applying the values given by the curves with those suggested by published data.

In the case of transformers the question is obscured by the fact that certain classes made to B.S.S. 171 will carry 10% overload continuously and 20% overload after full load for 80 minutes where the time constant is 2 hours. In these cases close agreement can be expected and it is, of course, necessary to identify the 100% load of the curves with 110% of the transformer rating.

The figures for 100% overload, starting from cold, i.e. without any initial load, give 30 minutes for a transformer compared with 0·6 hours, i.e. 36 minutes for the cable, providing the time constant of both components is 2 hours. This would probably be the case for a 10,000 kVA transformer, but not for a 10 kVA transformer. These results suggest that transformer cables should be liberally rated to permit the inherent overload capacity of the transformers to be utilised.

The wider question as to whether the economic current density would lead to operation at "higher than designed" temperatures depends upon the load factor and is outside the scope of the present considerations which are directed to maximum utilisation of existing equipment.

Manufacture of Capacitors in U.S.

AMERICAN PRODUCTION METHODS DESCRIBED IN NEW REPORT

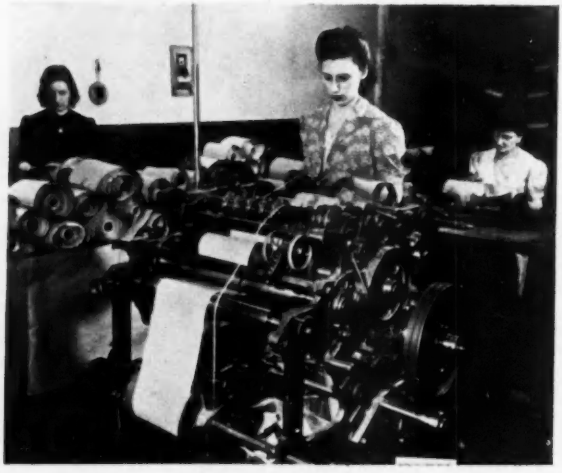
A REPORT of considerable interest to all concerned with the manufacture of dry electrolytic capacitors has recently been prepared for the Mutual Security Agency (Productivity and Technical Assistance Division) on the production, in the United States, of these units. The report analyses in detail the productivity methods adopted in four major manufacturing plants and is concerned solely with the single-section dry electrolytic capacitor with etched aluminium foil encased in hermetically sealed aluminium cylinders.

Key factors contributing to the productivity levels are mass production by assembly line techniques, the use of specially designed or adapted machinery, close quality control and inspection and alertness in adapting innovations in production methods.

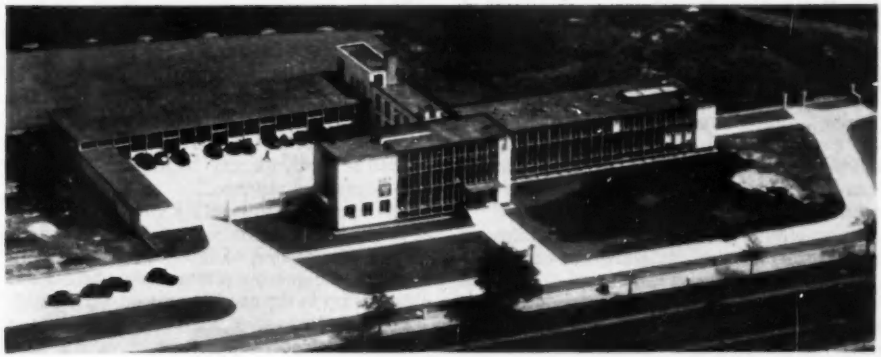
One of the plants examined is capable of producing an electrolytic capacitor of a certain specification in slightly more than 1½ man-minutes. All plants employ some type of incentive or group bonus to stimulate production, and relations between management and labour are extremely good on the question of new plant introduction, as steps have been taken to re-absorb all labour made redundant.

The report is particularly thorough, giving general technical information on all stages of the process, and detailed comparison between the plants involved.

A particularly interesting section to the works accounting department is that dealing with the production, planning and control forms. The document, BLS Report, No. 15, is distributed by the British Institute of Management, Management House, 8 Hill St., London, W.1, and is priced at 5s.



One of the special machines developed for capacitor manufacture is shown here trimming the foil



Improving Electrical Steels

NEW LABORATORY SERVES INDUSTRIAL GROUP

BEFORE the war, research and development activities of the Guest-Keen and Nettlefold group of companies were carried out almost entirely in individual units in each company. After 1945, however, the need developed for a research unit serving the entire group and, based on an existing organisation established by Joseph Sankey and Sons Ltd. for work on transformer steels, the group research laboratory was founded. This organisation, originally housed at Sankey's Bilston works, recently occupied a new building at Wolverhampton, which we were able to visit last week to view the various research activities which are at present being undertaken.

Laboratory's Three Functions

A part of G.K.N. Group Services Ltd., the laboratory has broadly three main functions. It carries out research and development of direct and immediate application to group members on processes and materials, advising and developing, where necessary, methods of testing materials. A certain amount of fundamental research in fields generally related to group activities is undertaken. Finally, it provides a general laboratory service for smaller member companies unable to provide these facilities, whilst acting as a centre for technical literature throughout the group.

To undertake work of such an implicit variety, the laboratory staff, which totals 115, including 40 graduates, is divided into some dozen sections. Among these are found electrical engineering, electrical construction and installation, instrumentation and control, operational research, in addition to metallurgical, chemical and mechanical engineering sections. The chief engineer of each section is responsible to Dr. T. Emmerson, who holds the position of director of research.

The heading illustration of an aerial view of the laboratory building shows the influence of modern architectural techniques

Transformer Steels

In view of the laboratory's original interest in transformer steels, it is not surprising that considerable work in this field is being undertaken. Much use is made in these activities of the advantages of electronics, one example being a power-frequency amplifier having an output of 1 kW from two output valves. Designed to supply the magnetic tester used by Messrs. Sankeys to investigate whole sheets of their transformer steels, this unit employs a negative feedback system to ensure that the flux wave itself in the iron is sinusoidal, whereas many tests merely provide a sinusoidal supply to the exciting winding. Feedback is provided from a search coil measuring flux in the iron. A local oscillator is the source of the 50 c/s supply, the frequency being held at this value by a Wien bridge control circuit.

A miniature version of this amplifier is being used at the laboratory to investigate samples of electrical steels, in association with a modified Lloyd-Fischer tester. The weighed sample, as

a small sheet, completes the magnetic circuit of the Lloyd-Fischer unit, which is supplied from a similar 50 c/s source. Having set the flux density in the steel to 13 kilogauss, provision is made, via search coils on the specimen, to display oscillographically its B-H curve, whilst instruments indicate the magnetising m.m.f. and power loss/lb mass. This last measurement is made automatically after setting a control in relation to the weight of the sample.

In the physics section also, work on magnetic steels forms part of its activities. By both optical and X-ray methods, crystal orientation in cold rolled transformer sheet is one such activity. Standard crystallographic X-ray equipment is used to investigate the annealing of hot-rolled sheet.

A small induction heating furnace is another installation in the laboratory. Powered from a Birlec 25 kVA, 10 kc/s alternator, the furnace is a vacuum type for producing high-purity iron alloys, both melting and casting being done without contamination. The furnace has a capacity of 2 to 3 lb of metal, and works at a vacuum pressure of less than 5 microns of mercury. It is intended to install a small rolling mill to handle the furnace output.

Batch-counting Equipment

The laboratory has also been engaged in work on batch-counting for screws, nuts and bolts produced by the G.K.N. group. Although these products are sold by numbers, the batching into numbered lots had been effected by weight—a somewhat long procedure. One of the first tasks given to the laboratory after its inception was the development of batch-counting equipment to obviate the weighing method.

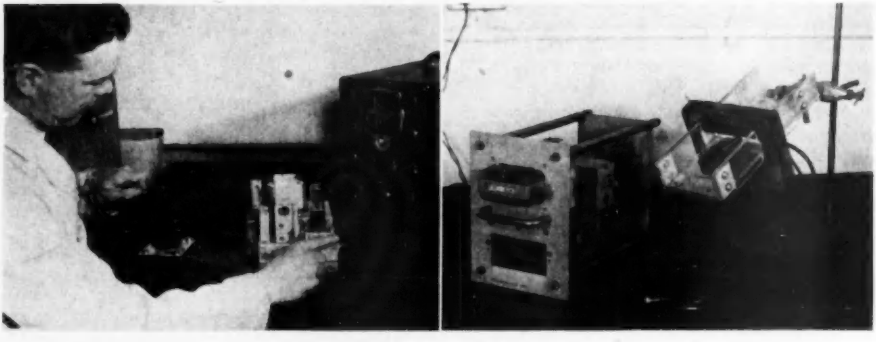
The equipment developed by the laboratory for this purpose is based on electronic techniques, one of its features being the liberal use of potted circuits. Most of the equipment is made up from separate units, plugged in to the main chassis, and all wiring, resistors, capacitors and other components on each are embedded in synthetic resin to improve its shock and vibration resistance.

The method of counting involves causing each product, as it passes off the production line into its carton, to interrupt a light beam normally energising a photo-electric cell. Each pulse set up in the cell is counted, using multi-anode gas-filled valves, and, in this case, at the 144th count a cold-cathode tube is triggered. This operates a relay to provide power to turn the table on which the carton is placed so that the filled carton is replaced by its empty successor. The time between each component passing through the counter is from 5 to 10 seconds, sufficient to allow the change to be made.

An electrical tool for cutting tungsten carbide steel forms a useful part of the equipment at the laboratory. Manufactured by Sparcatron Ltd., this machine utilises electric sparking between a brass electrode and the metal. Its cutting action is, in effect, a "tearing away" of the alloy by the sparking. Energy is provided at approximately 100 V from a capacitor-resistor source, and the physical process takes place under oil.

Mention should be made of the building itself, which is attractively designed in the contemporary style by Mr. Twentyman, of Messrs. Lavender, Twentyman and Percy, of Wolverhampton. Building was undertaken by F. and E. V. Linford, of Cannock, C. Howard Crane of London acting as consultants.

On the left, electronic ringing of bolt heads indicates any structural failure present on the c.r.t. screen. Right is shown a laboratory construction of the magnetic bolt counter



Research on Semi-Conductors

New Electrical Phenomena shown at Royal Society Conversazione

ONE of the most noticeable features of the Royal Society's Conversazione last week was the prominence of germanium. This up-and-coming metal was the centre of several research activities apart from demonstrations of its practical uses. In the main, exhibits were concerned with showing the various effects of light on germanium.

It is known, for example, that, light falling on to germanium, some of the electrons forming bonds between germanium atoms are displaced. Vacancies left by the electrons are known as positive holes; they are capable of carrying current, and it is partly by this mechanism that germanium is able to act as a transistor. In view of the importance of these holes in the conductivity of the metal, knowledge of their lifetime in germanium of any given characteristic can provide means whereby that having the most suitable characteristic for a particular application may be selected.

Photo-conductivity effects

Apparatus on show at the Conversazione illustrated investigations into these photo-conductivity effects. A narrow slit of light was directed on to a crystal of the metal and a "cat's whisker" probe touching the surface a little distance from the light provided indication of the diffusion of the holes away from the illuminated area. As each displaced electron recombines with a hole, a small amount of energy is released, which the probe measures. The greater the distance of the probe from the light, the smaller the number of holes and electrons available for recombining and hence the energy gradient away from the lighted area is a positive indication of the holes' lifetime.

As a further extension of this phenomenon, if light is allowed to impinge on a "p-n" junction in germanium, the characteristic of the germanium may be substantially altered. The "p-n" junction is, in effect, a potential carrier in the germanium crystal each side of which displays markedly different current-carrying abilities. On one side, current carrying is effected by positive holes and on the other by electrons.

It is the junction which imparts to the germanium its semi-conducting properties when a potential is applied across it. If, however, light falls on the junction, this characteristic is altered, permitting a materially increased reverse current flow. The light, as mentioned earlier, displaces electrons from holes, and the added energy thus possessed by these displaced bodies enables a greater number to overcome the potential barrier at the "p-n" junction.

Transparency to Infra-Red

Germanium, although opaque to radiation in the visible spectrum, is transparent to light over a limited range of wavelengths, including infra-red. This metal, however, exhibits a phenomenon not known to other substances in that its transparency to infra-red may be varied by placing the metal in an electric field. This effect was demonstrated by applying audio frequency e.m.f. across the crystal placed in the path of infra-red light from a tungsten filament lamp.

The beam of light thus modulated was detected by a lead-sulphide photo-electric cell, the output being fed to a loud-speaker. As the audio-frequency source was a gramophone pick-up, there was displayed the unusual and novel spectacle of sound transmission without the conventional apparatus of radio receiver, transmitter and aerial network, and at a quality comparable with that of the B.B.C.

Silicon Phenomena

It is but a short distance, in the table of elements, from germanium to silicon, and this material was shown to possess equally unusual characteristics. In this case, the reverse current characteristics of a silicon crystal diode undergo a considerable change when the diode is subjected to a voltage pulse of very short duration. It is believed that when the pulse is applied, electrons from the source are trapped between the silicon atoms. Applying a reverse potential to the diode after such treatment produces a characteristic in which several effects are noticeable. Initially the current-rise is much greater, and then at a certain period, a short, pronounced current peak is produced. Several

of these occur at different intervals as the reverse potential is increased. The effect is transitory, a normal reverse current characteristic being obtained on applying an increasing reverse potential for a second time. One explanation proffered for this phenomenon suggests that different types of bonds hold electrons between silicon atoms. As the potential required to break each type of bond will differ, increasing the potential from zero releases a "burst" of electrons as each bond is broken.

Electro-Luminescence

Of the new ways of producing light from electrical energy, electro-luminescence still possesses that aura of novelty which once accompanied fluorescent lighting, as a demonstration of this phenomenon gave ample indication. Although one of the major problems yet to be overcome is its low efficiency—1 to 2 lumens/watt at power frequencies—before electro-luminescence becomes a practical proposition, present developments have resulted in a comparatively convenient method of manufacture of these sources. Made as a simple capacitor, one plate takes the form of a transparent conducting surface on glass. Superimposed on this layer is the dielectric containing the phosphor, backed by another metallic film as the second plate. Such a capacitor has a capacitance of about 0·02 μF from a source area of approximately 5ins.square, and is normally energised at 150V. Coloured sources may also be produced in bulb form. A technical description of electro-luminescence was published in the ELECTRICAL TIMES, July 19, 1951, p. 100.

Our readers' views . . .

Layman's Province

IT appears that contributors E. M. Ackery and "R.A." are somewhat apprehensive of the conditions relating to elusive earth mentioned in my notes published on 23 April. So perhaps the following observations will clarify the matter. I agree that the lead sheath of the cable was not secured against entering into the terminal box, and that the use of such cable was not in accordance with the recommendations under I.E.E. regulation 1309; these matters being, of course, entirely due to the contractor who originally installed the heater. I fear, however, that with the ever-increasing number of self-styled electrical engineers now carrying out work, such faults can be expected, but "R.A." can rest assured that the installation is now in regulation order.

Referring to Mr. Ackery, I would not agree that the term "dabbling" is in any way derogatory, since it is clearly pointed out in factory regulations and insurance conditions, that any unqualified person who removes, alters or interferes with electrical apparatus is guilty of malpractice. I would rather suggest that the manufacturers should make provision for the heater thermostat to be accessible without need to remove any part of the apparatus, and thereby eliminate any risk. Remember the first thermostats were fitted into the tank separately. No, Mr. Ackery, in this case a little foresight in design would have been desirable.

J.R.

DUNDEE

Large Sets Abroad

POINT is given to the U.S. Productivity Team's report on U.K. supply system, by the announcement in the May 18 issue of *Electrical World*, that Detroit Edison have ordered two in number 353 MVA turbo-generator sets for delivery in 1955. Steam conditions are 2,000 p.s.i. at 1,050° F; reheat, 720° F to 1,000° F.

Additional point is given by the fact that U.K. manufacturers have filled more overseas orders for 100 MVA sets than for home installation. Only 30 MVA and 60 MVA sets have been ordered for home installation at a time when generating capacity was desperately needed.

J. P. Thornton

VICTORIA, BRITISH COLUMBIA

Electric Razors—and Safety

"HOTELS ENGINEER" in your issue of May 21 raises a point which has been causing considerable thought for some time. Habit dies hard, and the practice of shaving in the mirror over the wash basin will persist, even if electric razors are used.

The only logical solution would appear to produce a moulded plug of special design on the lead to the razor and install a special socket, in an earth free place which would accept this plug and this plug only. This would, of course, be a long term policy as until it became universal, razor owners would simply fit a bayonet catch plug to the lead and carry on as usual.

KINGSTON. *A. Creighton*

NOTES ON WIRING by Megohm

Registration

ARTICLES appearing in the April issue of *Registration* leave one wondering whether it is safe to use electrical energy at all at present-day mains potential. In the articles attention is drawn to danger and more danger; the following observations are made: (1) Over one quarter of all accidents involving electric shock were made worse by faulty earthing systems. (2) H.M. Senior Electrical Inspector of Factories performs a useful service by giving details of domestic as well as factory accidents and his reports serve to show that: a loose wire can be as dangerous as a loose dog on the highway; faulty earthing can be as serious as faulty motor car brakes; over-loading is as disastrous as speeding.

It is also stated that in the past suppliers of electricity and electrical appliances have played up the wonders and played down the dangers connected with electricity. Further, increasing sales were of greater interest than increasing accidents and the various causes of accidents could very briefly be classed under two headings: "Lack of earthing," and "slipshod work done or in the process of being done."

Coronation Illuminations

In connection with Coronation illuminations, attention is drawn to Section 5 of the I.E.E. Regulations covering temporary installation work, and the statement is made that these regulations are not mere pious expressions of opinion but are the outcome of practical and experienced engineers who are fully aware of the danger and risks to be overcome. It is also stressed that any fire and/or shock that might occur would be intensified with the masses of people assembling to view the Coronation.

Registration, which is the official review of the National Register of Electrical Installation Contractors, advocates that the following action be taken to minimise the risk of shock and fire from electrical installations and appliances: Let all those concerned of whatever degree see to it that in 1953 most uncommon care is given to correct earthing; education, supervision and adequate inspection are necessary to secure the desired results.

It is stated since there is a Highway Code for motorists there should be an inspection code which is applicable to electrical contractors.

Ten rules are put forward covering inspecting conduit installations with the suggestion that these rules might be designated the "Ten Commandments." Further, it is stated, it is a non-stop task keeping a check on those not only starting in but also those established in the electrical installation business.

In connection with electrical appliances, it is urged that makers should be induced to label their electrical appliances having a possible shock risk and indicating that it should be properly installed and used. Also that with electricity at the command of tens of millions of people from the young to the old it needs a big effort to make them alive, and keep them alive, to the danger of electricity.

Better Ways

The foregoing statements are made in respect of the dangers that can arise when electrical appliances are energised at a potential of 200/240v a.c. and one is left with some doubts whether the approach made by *Registration* to this problem is the right one and of service to the electrical industry. For example, it is difficult to believe that the electrical appliances manufacturers and supply authorities, prior to vesting day, deliberately marketed and permitted to be installed electrical appliances that would be a danger to the consumer. I believe there must be a better approach than broadcasting danger to ensure that the marketing, installation and use of properly designed equipment and installation work is effected.

Does *Registration* really believe that the licensing of motorists has not reduced motoring accidents? *Registration*, if it really desires to see good and safe installations, which I believe it does, could usefully direct its full energy to: (1) the immediate establishment of a national clearing house for materials and appliances used in and on electrical installations; (2) the prompt registration and licensing of electrical contractors and electricians; (3) the early reduction of the supply voltage to residential premises in common with the general practice adopted in the United States and on the Continent to ensure the maximum safety against electric shock.

Equivalent Circuits of d.c. Machines

Their derivation described for simple method of machine system analysis

By A. S. ALDRED, M.Sc.

THE derivation of equivalent circuits of d.c. machines brings to light many unusual analogies, some of which are presented here in simple form. An interesting example is the separately excited d.c. motor shown in Fig. (1). The field voltage V_f is maintained constant and a variable d.c. voltage V_a is applied at the armature terminals. The equation describing the behaviour of the armature circuit electrically is :—

$$V_a=(R_a+L_ap)I_a+E_b \quad \ldots\ldots\ldots\ldots (1)$$

where R_a and L_a are the armature resistance and self inductance respectively ; E_b is the armature back e,m,f, and p is the Heaviside operator representing $\frac{d}{dt}$

Now E_b is proportional to speed and may be written :—

$$E_b=k_1\, p\theta$$

$p\theta$ being the speed in radians per second. Also the torque exerted by the armature is proportional to armature current so we may write :—

$$T_a=k_2I_a$$

In practice this torque is balanced by the sum of the inertia torque, friction torque and load

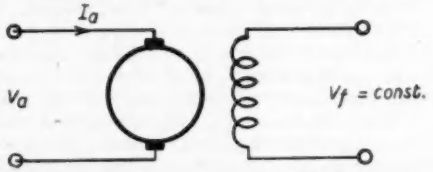


Fig. 1. Simplified circuit diagram of the separately excited d.c. motor

torque acting on the armature shaft. Taking first the case when the only retarding torque is that due to inertia we can say :—

$$T_a=k_2I_a=Jp^2\theta \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

J being the inertia of the armature and load. From (2) we see that :—

$$p\theta=\frac{k_2I_a}{Jp}$$

and substituting this in the expression for E_b gives :— $E_b=\frac{k_1k_2I_a}{Jp}$

Equation (1) therefore becomes :—

$$V_a=(R_a+L_ap+\frac{k_1k_2}{Jp})I_a \quad \ldots\ldots\ldots\ldots (3)$$

This equation is identical with that of a series R,L,C circuit in which the capacitor C has the value $\frac{J}{k_1k_2}$ farads. The equivalent circuit for the separately excited d.c. motor with retarding inertia torque only is shown in

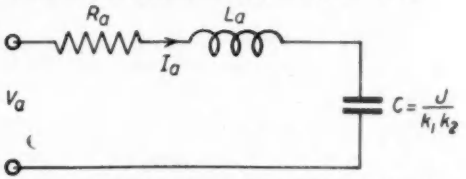


Fig. 2. Equivalent circuit of d.c. motor with inertia load only

Fig. (2). The voltage across the capacitor is $\frac{I_ak_1k_2}{Jp}$ volts which is k_1 times the speed of the motor.

Presence of Friction Torque

If in addition to inertia torque a viscous friction torque acts on the armature shaft equation (2) becomes :—

$$T_a=k_2I_a=Jp^2\theta+Fp\theta \quad \ldots\ldots\ldots\ldots (4)$$

where F is the viscous drag torque per unit of speed.

From (4) we get $p\theta=\frac{k_2I_a}{Jp+F}$

and therefore the back emf $E_b=\frac{k_1k_2I_a}{Jp+F}$

Substituting in equation (1) gives :—

$$V_a=(R_a+L_ap+\frac{k_1k_2}{Jp+F})I_a$$

$$=\left(R_a+L_ap+\frac{1}{1\Big/\frac{k_1k_2}{Jp}+1\Big/\frac{k_1k_2}{F}}\right)I_a \quad (5)$$

The expression $\frac{1}{1\Big/\frac{k_1k_2}{Jp}+1\Big/\frac{k_1k_2}{F}}$ in equation (5) is the impedance of a parallel RC

circuit in which $R=\frac{k_1k_2}{F}$ and $C=\frac{J}{k_1k_2}$ as before.

The equivalent circuit of Fig. (2) is, therefore, modified by the presence of viscous friction to that of Fig. (3). If a load torque is present in addition to inertia and friction, no simple equivalent circuit can be derived. The electrical equivalent of inertia is usually considered to be inductance, but in this case the kinetic energy of the armature is represented by the energy stored in the equivalent capacitor C. The value of C for any machine can be calcu-

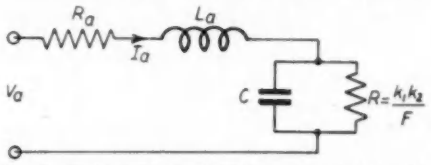


Fig. 3. Equivalent circuit of d.c. motor with inertia and friction load

lated from the constants k_1, k_2 and J. For example, for a 500 h.p. 500 r.p.m. 500 V d.c. motor which is 90% efficient, and whose armature inertia is 109 slug ft², the capacitance of C is approximately 2 farads.

The capacitance of a d.c. motor armature is usually very large, as shown by the above example. It is a property of the machine and its existence is clearly brought to light in the derivation of the equivalent circuit. However this large capacitance cannot be utilised at power frequencies, since the capacitive reactance at these frequencies is much smaller than either the resistance or inductive reactance of the armature.

Metadyne Transformer

Another interesting example is the equivalent circuit of the metadyne transformer, shown in Fig. (4) connected to the armature of

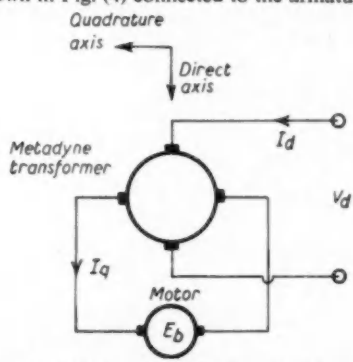


Fig. 4. Metadyne transformer with motor load

a separately excited d.c. motor. Direct axis and quadrature axis quantities are designated here by suffixes d and q. The direct axis circuit equation is :—

$$V_d=(R_d+L_dp)I_d+k_qI_q \quad \ldots\ldots\ldots (6)$$

k_q is the voltage generated in the direct axis armature circuit per unit of current in the quadrature axis circuit.

The quadrature axis circuit equation is :—

$$E_q=k_dI_d=(R_q+R_a+L_qp+L_ap)I_q+E_b \ldots (7)$$

k_d being the voltage generated in the quadrature axis armature per unit of current in the direct axis circuit. If the same substitution as before is made for E_b, namely $E_b=\frac{k_1k_2I_q}{Jp}$, and I_q is eliminated from equations (6) and (7) we get :—

$$V_d=[R_d+L_dp+k_dk_q/(R_q+R_a+L_qp+L_ap+\frac{k_1k_2}{J})]I_d$$

which can be written as :—

$$V_d=[R_d+L_dp+\frac{1}{1\Big/\frac{k_dk_q}{R_q+R_a}+1\Big/\frac{k_dk_q}{(L_q+L_a)p}+1\Big/\frac{k_dk_qJp}{k_1k_2}}]I_d \ldots (8)$$

The last term in the bracket of equation (8) is the impedance of a parallel R,L,C circuit in which $R=\frac{k_dk_q}{R_a+R_q}$ ohms, $L=\frac{k_dk_qJ}{k_1k_2}$ henrys and $C=\frac{L_q+L_a}{k_dk_q}$ farads.

The equivalent circuit of this combination of d.c. machines is shown in Fig. (5). The voltage

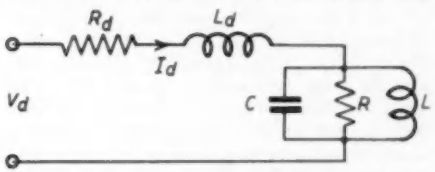


Fig. 5. Equivalent circuit of metadyne transformer connected to motor load

across the parallel branch of this circuit is proportional to the quadrature axis current I_q and is k_q times it. In this equivalent circuit the kinetic energy of the motor armature is represented by the stored energy in the inductance L. For a metadyne transformer with a static load the inductance in the parallel branch is omitted from the equivalent circuit.

In conclusion, it can be said that equivalent circuits for most d.c. machines and machine combinations can be derived, which may be used to simplify machine system analysis and to solve machine problems by differential analyser techniques.

Connections to Aluminium Cables

AMERICAN RESEARCH APPROVES TIN-PLATED COPPER-ALLOY

FURTHER light has been shed on the vexed problem of jointing on to aluminium overhead cables in exterior conditions by a report by Messrs. H. R. Harrison and R. W. Honebrink, published in the May issue of *Electrical Engineering*.

As is well known, the three main factors involved in this problem are (a) electrolytic corrosion which occurs when dissimilar metals are brought into contact with aluminium—particularly in the presence of moisture; (b) the high resistance oxide film characteristic of aluminium; and (c) the softness, creep and high thermal coefficient of expansion of aluminium. Two specific problems also arise; the interstrand resistance of the cable, and the difficulty of preventing moisture and corrosive gases from affecting the contact surfaces.

Object

The object of the investigation was to evaluate the effect of certain main factors. These were: the relative merits of serrated and smooth-contact surface connector designs; the effect of high humidity; the value of various joint compounds and the creep and expansion due to heat cycling. In the test procedure a bolted type connector was clamped to each end of a 15-in. length of 500,000 circular mil (0·392 sq in.) aluminium cable. Before assembly the oxide layer was removed by emery paper, and the joints were rinsed in clean oil, but not wiped, to prevent further oxidation. The tests were conducted in a humidity chamber to simulate outdoor exposure conditions. The test specimens were connected in series and subjected to a 600 ampere current (150% of cable rating) in a three-hour on and three-hour off cycle. This gave a temperature swing at the joints of about 55° C between on and off periods. The test lasted for about six months (680 heat cycles).

Results

The first major result found, was that the joints with serrated contact surfaces had a lower value than those with smooth surfaces, which indicated that the biting action of the surfaces, had the same advantage for use with aluminium cable as it had for copper cable. On the basis of this conclusion, all following tests were carried out with serrated contact surfaces.

These tests involved connectors having various metallic finishes with and without joint compounds, and to ensure that resistance measurements would simulate actual applications, the strands at the cable ends were left unwelded so that the effect of interstrand resistance could be taken into account. Welding between strands was, however, carried out at the centre of the cable to ensure an even current distribution in the event of a failure of one of the joints. This series of tests also lasted for six months, and it was found that out of the following seven finishes (cadmium, zinc, tin, silver, nickel, aluminium/silver bimetallic inset and aluminium/copper inset) only the joints with cadmium- and tin-plated copper-alloy performed satisfactorily and were comparable with the standard copper cable joint. All other joints showed rapid and accelerating increases in resistance and failed by excessive temperature rise. Further, as cadmium was known to deteriorate in the presence of petroleum products or fatty acids and since some compounds containing these might be used with connections it was felt that cadmium plating could not be considered as a satisfactory finish. The use of compound itself showed little improvement although this was consistent.

Differential Expansion

The question of differential expansion between the aluminium cable and the clamping bolts of the connector had also been investigated, and it was found that both aluminium and silicon-bronze bolts showed little difference in contact resistance. Steel hardward should not be used as in every case failure ultimately occurred. It was also found that the softness or hardness of the conductor had little effect on the contact resistance.

Finally, some comments were made on the connector "tang," and it was thought that the tin-plated copper alloy connector had the advantage over cast aluminium as the tang could be connected to aluminium copper or silvered surfaces without further modification.

Further investigation will be necessary to establish the optimum materials for corrosive atmospheres, variation in contact surface size and other cable sizes.

PROBLEMS AND PRACTICE in Engineering

Grease for High-Speed Motors

A REQUEST was received that an investigation be made as to why a newly installed high-speed motor supplied from a frequency changer failed to run up to speed. The particulars of the whole outfit were as follows:—

Driving Motor

2,920 r.p.m.
400/440 V, 2·8 A
50 c/s, 3-phase.

Frequency Changer

1·25/1·56 kVA, 0·8 p.f.

Input	Output
400/440 V 1·9 A	105/146 V, 6·8 A
50 c/s, 3-phase	300/400 c/s, 3-phase

High-speed Motor

18,000/24,000 r.p.m., 0·9/1·2 h.p.
105/146 V, 5·8/6·1 A
3-phase.

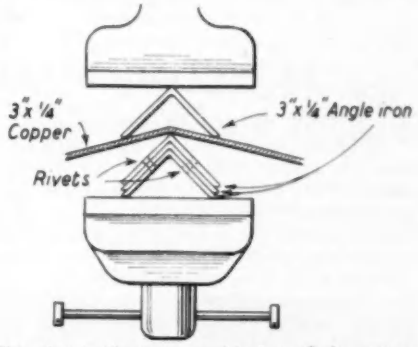
The driving motor and frequency changer were run up to speed and the high-speed motor switched in circuit. Neither in the low speed (18,000 r.p.m.) nor the high speed (24,000 r.p.m.) position would the motor accelerate above approx. 300 r.p.m. The overload trips eventually operated and shut down the motor. The driving spindle of this motor was tested and appeared to be reasonably free to rotate. After taking a number of voltage and current tests it was apparent that the fault was in the high-speed motor. This motor was then dismantled, examined and tested for electrical defects but was found to be in order. After washing out the bearings and replenishing with a small amount of the grease supplied with the machine, the motor was assembled and again connected up, but the results were the same as previously obtained. As further tests did not disclose any electrical fault it was suspected that the grease used in the bearings might be unsuitable. The motor was placed in an oven and warmed up to approx. 130° F. While at this temperature the motor was connected to the frequency changer when it ran up to its correct speeds without any trouble. However, when the motor was stopped and allowed to cool to normal ambient temperature the motor refused to run up to its correct speeds. The bearing manufacturers were contacted and asked to recommend a suitable grease which, on being used, was found to allow the high-speed motor to accelerate up to normal speeds. The following locked torque tests on the high-speed motor were obtained with the bearings only lightly lubricated with oil:—

Locked torque at 18·5 V, 50 c/s, 7·5 oz/ft.
,, ,, ,, 110 V, 300 c/s, 4·0 oz/ft.
,, ,, ,, 146 V, 400 c/s, 3·5 oz/ft.

It will be seen that the starting torque of this motor was fairly low and only required a little extra friction to prevent the motor running up to speed.—*E. A. Robbins.*

Bending Copper

THE following is an idea for putting various angles in any flat copper up to 3 in. x ¼ in. First procure some 3 in. x ¼ in. angle iron, enough to cut four pieces 3 in. long. Lay three pieces in each other, drill and rivet through.



This sketch illustrates positioning of the copper for bending

When ready to set copper, fit the remaining single piece of angle iron in jaws of vice on end, next the copper to be set, then the three pieces of angle that are now riveted, tighten up vice to whatever angle is required. Any angle from 90° to 180° can be easily made.—*F. W. Miller.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Electrical Patents In 1952

IN 1952, there were 33,142 applications for patents, and 21,380 patents were sealed; 8,447 new designs were registered, and 6,846 trade marks were registered. These are the leading statistics from the 70th report of the Comptroller General for Patents Designs and Trade Marks, and they show that activity is continuing to expand in the first two categories, though not in the third. Fees from patents amounted to £789,206, and the total income of the department was £967,511.

The trend of invention as discerned by the Comptroller General shows steady activity in all branches of the electrical arts. An apparent desire to dispense with the use of electric discharge tubes was shown by the development of transistors and similar devices, and by the use of magnetic amplifiers in low frequency circuits. There was activity in developing phosphors which become luminescent upon the direct application of electron bombardment, and interest was shown in the use of enamelled wire or bare wire as a substitute for wave-guides. Another high frequency development was the increased application of the results of recent studies on information theory.

Amongst the heavier applications of electricity by inventors, activity in regard to clutches using magnetic fluids as the coupling medium showed an increase.

ELECTRICAL AND OTHER PATENTS ACCEPTED IN 1952

Subject	Primary feature of invention		Secondary	
	1951	1952	1951	1952
Electric lamps, incandescent ...	20	42	7	23
Heating by electricity	131	151	58	72
Lamps for lighting, etc., details...	53	69	32	28
Lamps for lighting, etc., kinds of	43	50	19	30
Steam generators...	32	20	21	15
Steam separators and superheaters	9	16	11	9
Turbines, etc.	139	157	91	105
Dynamo electric machines, etc....	154	211	85	126
Converting electric currents ...	134	181	64	68
Electric supply systems ...	344	310	153	184
Conducting electricity	74	121	38	34
Measuring electricity	197	312	112	127
Electric couplings, etc.	127	174	43	53
Electrolysis	85	87	29	35
Electric motor control systems...	85	110	71	71
Electric switches	291	305	144	163
Electric discharges or vapours, tubes, etc.	421	502	92	86

DETECTING MOISTURE IN INSULATION

FURTHER research by the E.R.A. into insulation deterioration forms the subject matter of a report (Ref. V/T105), recently published. Work described in this report has been giving attention to the detection of moisture in insulating materials, detection being carried out at low frequencies. The range of frequencies used extended from 0·18 to 56 c/s, the lower limit being extended as far as possible to obtain the sensitivity normally possible with d.c. conductivity tests.

One of the drawbacks of the d.c. conductivity test for moisture is that moisture will only be detected if it is uniformly distributed throughout the material. The use of an a.c. source at power frequencies for a power-factor test, on the other hand, although able to detect moisture, is less sensitive than the d.c. test. By measuring, however, variation of admittance over a range of low frequencies, the presence of moisture in the insulating material can be easily detected.

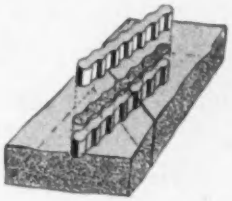
Measurement was carried out using an R-C sine wave oscillator and a bridge, using as standard references an effectively loss-less capacitor and a conductor designed to have, effectively, no lumped capacitance and a minimum of distributed capacitance. Detection was carried out using an oscilloscope. Tests were carried out on artificial specimens of fibre and s.r.b. paper-board, the fibre being used by virtue of its comparatively high rate of moisture absorption. Further tests were also made using current transformers (for use at 6·6 kV) and 33 kV switchgear bushings.

Not only do the results indicate that this method provides a sensitive indication of moisture in insulating materials, but there is scope for modifying the equipment for use in the field. It should be pointed out that the test is purely relative, measuring the displacement of the characteristic due to moisture, but there is indication that the absolute value of this characteristic may be used as a means of measuring the water content of the specimen.

In another report (Ref. W/T26) is discussed the use of electricity to increase soil temperature, and is one of the papers presented at the 13th International Horticultural Congress, held in September of last year.

Repairing Large Fractures

THE USE OF METAL KEYS FOR LOCKING CRACKS PROVES ITS WORTH IN HEAVY REPAIR



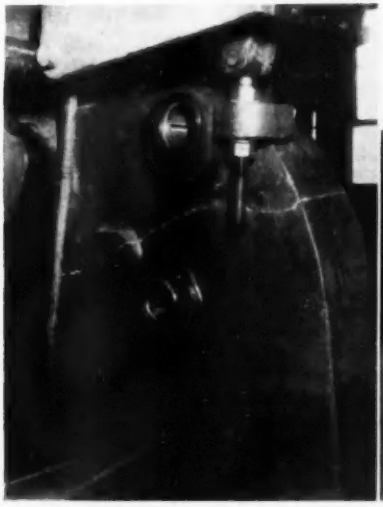
THE Metalock process, originally developed for the repair of fractured castings and forgings in inflammable locations where the use of welding methods was precluded by fire and explosion risks, has now become established in its own right as a speedy and effective method of carrying out repairs in ordinary circumstances.

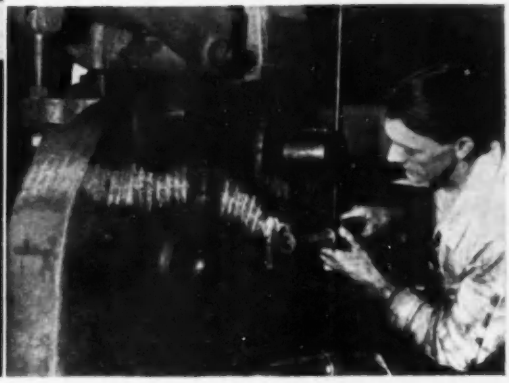
The method used is similar to that adopted in some forms of carpentry whereby "wiggle" nails are used to secure stress-points in wood. Specially-shaped "keys" are cold worked one at a time into grooves or slots cut transversely across the fracture or crack, restoring to each individual job a precise degree of strength and flexibility. The strength of the join required is calculated, and an appropriate number of keys used. The first key is pneumatic-hammered to lock solidly against the parent metal in the bottom of the slot, which is, of course, cut to a depth according to the number of keys required. The alloy used for the keys is heat resisting, has great tensile strength, and has a low coefficient of expansion.

Further Developments

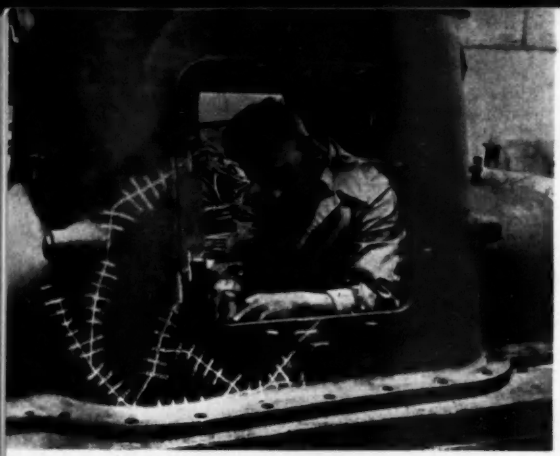
Two further developments in this technique have now been generally applied with success. One, Metalace, employs studs in connection with the keys and can be used to seal cracks in boilers, tanks or cylinders, and the second, "Masterlock," involves the dowelling of an inlay of high-strength alloy plate. The dowels are cold worked into matching half holes between the parent metal and the plate.

Although developed in Canada and the United States several years ago, the system has only recently become generally available in this country due to the difficulty of obtaining and training the highly skilled operators needed for precision work. There are, however, now some 37 technicians covering the British Isles. Each operator carries his hand and pneumatic tools, the latter requiring a compressed air





The method of repair is shown in these photographs. On the left is the original fracture in a large casting, and below an operator is finishing off after "stitching"



Here an operator is working on a large and complex fracture. Note the spacing chosen for the "keys"

supply of between 80 and 100 lb/sq in. The largest tool has a consumption of 14 cu ft/min, which is usually available on site. If it is not a portable compressor is hired.

Technique

The basic technique consists of clamping the cracks, fractures or breaks in precise alignment. After clamping, a jig is used to drill lines of blind holes in the parent metal, transversely to the fracture. These pilot holes are opened out to size and their depth calculated so as to restore the precise degree of strength required. A gun tool is then used to remove the metal between the holes and the Metalock keys are driven and peened into the slots by pneumatic hammers.

Typical examples of work carried out with full success include the repair of a 3 ft 7 in. fracture in a $\frac{7}{8}$ in. thick cast-iron bedplate, a 6-in. fracture in $1\frac{1}{2}$ in. to $2\frac{1}{2}$ in. thick exhaust ports which was repaired by two operators in 16 days, and the repair by two operators in five days of a 50-in. fracture in a $1\frac{1}{4}$ in. thick cast-iron steam jacket with an operating pressure of 100 lb/sq in.

Further details of the process can be obtained from Metalock (Britain), Ltd., Grand Buildings, Trafalgar Square, London W.C.2.

Monopolies Commission Procedure

DETAILS of the procedure adopted by the Monopolies Commission when investigating an industry are given in the Sixth Report of the Select Committee on Estimates, which has been published by H.M. Stationery Office. It is stated that each investigation is carried out by a team headed by an officer of the rank of Principal, under the supervision of a panel of members of the Commission.

This panel system has speeded up the work of investigation, but it is not thought that an increase in staff would have the same effect. This follows because however many staff teams are engaged on simultaneous enquiries, the entire Commission is responsible for each report. To quote the chairman: "The bottleneck is really the Commission." The Commission meets once a fortnight, though panels of members concerned with individual enquiries arrange their own meetings to suit the progress of their investigations.

Once the Board of Trade has referred an industry to the Commission, evidence is invited from all interested, and an informal meeting is held with the trade associations concerned to map out the broad lines of enquiry. From the evidence that becomes available, the Commission forms a general picture of the structure of the industry, and an investigation is started by its accountant, who is assisted as necessary by the Board of Trade's accountant. With its factual inquiries completed, the Commission then begins to consider the public interest aspects of the case, and at this stage usually informs the trade associations of its provisional conclusions. The question of public interest is then argued at a formal hearing. The report and recommendations follow in due course, three to six months later.

The Select Committee has recommended, amongst other changes, that at least one full time member of the Commission should have had a wide experience of industry or commerce; that consideration be given to the employment in some instances of professional industrial advisers; that an effective procedure should be set up for ensuring that industries which have entered into voluntary agreements are standing by them; and that urgent consideration should be given to devising a method of shortening the time-lag between publication of a complaint and its investigation, and the time taken to complete an investigation and produce a report.

PRODUCTION IN 1950

Electrical Engineering Expansion Continued

CONTINUED expansion of output is apparent from the statistics now being published by the Board of Trade of production during 1950. These figures are based on the Census of Production for that year, and amongst the early volumes that have been issued is that dealing with engineering, shipbuilding and electrical goods.

The figures for "electrical engineering trade" show an increase on the year of over 9,000 in the total number employed and £14,451,000 in the net output. The net output per person employed (i.e., after allowing for the cost of materials, etc.) was increased from £525 to £560. In the electric wires and cable trade, there was a fall in the numbers employed and the net output was some £1,595,000 down, probably due to difficulties about supplies of material. In the result, net output per person employed dropped from £637 to £623.

For the purposes of the census, "electrical engineering" is defined as the manufacture of of electricity generating plant, transformers, dynamos, electric motors, switchgear, electrical equipment for motor vehicles, cycles and aircraft and other electric goods except wires and cables, radio and telecommunication apparatus and equipment, batteries and accumulators, and electric lighting accessories and fittings.

There is an unusual split in the definitions of "radio and telecommunications" and "electric lighting accessories and fittings." The former covers not only telegraph and telephone equipment, radio apparatus and gramophones; it extends to electric lamps, discharge lamps, "etc." In the second trade is included only the manufacture of electric lighting accessories and fittings, and electric bell apparatus.

The general volumes of the Census reports are followed at a later date by more detailed analysis of the returns for particular trades.

PRODUCTION STATISTICS FOR THE UNITED KINGDOM ELECTRICAL ENGINEERING INDUSTRY, 1950

		Electrical Engineering	Elec. Wires & Cables	Radio & Telecomm. Private	Radio & Telecomm. Govt.	Batteries and Accumulators	Elec. Lighting Access. & Fittings
Establishments employing on average more than 10 persons	No.	952	82	424	28	49	158
Total value of sales	£'000	259,069	102,949	135,567	2,026	24,443	15,986
Total amount charged to customers for work done	£'000	19,763	2,125		45,883	185	
Stocks for sale and work in progress:							
At beginning of year ...	£'000	60,015	15,730	28,938	1,545	2,786	1,782
At end of year	£'000	61,736	16,905	30,519	1,634	3,000	1,806
Payment for transport by other firms	£'000	2,854	1,304	624	5	255	115
Gross output (production) ...	£'000	277,700	104,944	136,523	47,992	24,587	15,896
Purchases of materials and fuel ...	£'000	126,145	71,513	68,137	9,587	15,666	7,425
Stocks of materials and fuel:							
At beginning of year	£'000	31,147	12,674	14,144	804	2,345	2,034
At end of year	£'000	32,514	14,870	16,022	693	2,829	2,106
Cost of materials and fuel used ...	£'000	124,777	69,317	66,260	9,697	15,181	7,354
Payment for work done on materials given out	£'000	2,683	294	1,450	13	6	192
Net output	£'000	150,239	35,333	68,814	38,283	9,400	8,350
Average number Operatives ...	No.	198,209	42,167	106,999	59,166	12,173	13,339
employed: Other workers	No.	69,891	14,503	35,944	13,282	3,403	3,085
Working proprietors	No.	71	—	19	—	1	12
Total employment, including working proprietors	No.	268,171	56,670	142,962	72,448	15,577	16,436
Net output per person employed	£	560	623	481	528	603	508
Wages and Of operatives ...	£'000	61,611	12,613	29,029	21,278	3,607	3,351
Salaries Of other workers...	£'000	31,018	6,413	15,224	6,053	1,584	1,491
Employers' share of N.I. contributions	£'000	2,607	542	1,321	725	146	147
Outworkers: average number employed	No.	755	50	279	16	—	261
Payments to outworkers	£'000	61	7	20	—	—	16
Firms employing on average 10 or fewer workers	No.	892	4	136	1	124	49
Average number employed ...	No.	5,226	19	812	2	572	325
Estimated average employment: all firms	No.	273,944	56,689	143,958	72,450	16,203	16,785

A.C. Supply for a new Oil Tanker

High usage for main auxiliaries in the latest Eagle Vessel

AN exceptionally high usage of a.c. has been adopted in the Eagle Oil and Shipping Co.'s new tanker, s.s. *San Florentino*, recently built by Cammell Laird and Co. Most of the electrical plant was supplied by the General Electric Co. to a specification carefully framed by the owners to secure maximum benefit from the use of a.c., a major object being the reduction of maintenance costs.

Generating Plant

The generating plant consists of Brotherhood turbines driving two G.E.C. alternators, each of which is a 550 kW, 440 V, 3-phase, 60 cycle/sec, salient-pole machine running at 1,200 r.p.m. with direct main and "V"-belt driven pilot exciters. A stand-by alternator, also used when the ship is docked, has an output of 200 kW at 600 r.p.m. and is driven by a Polar engine.

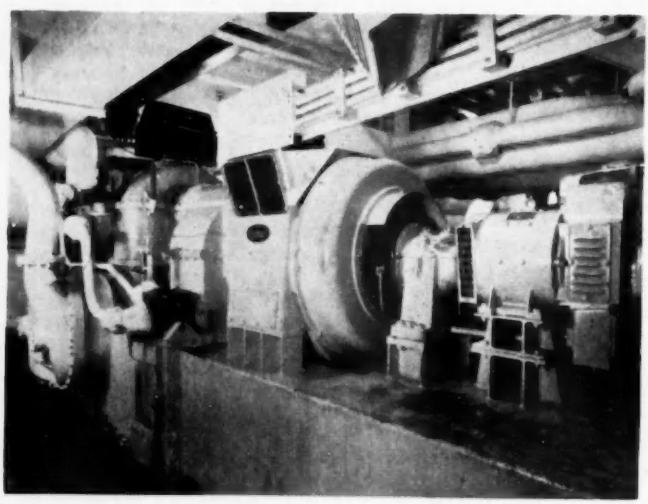
In view of the heavy peak loadings which may occur on the electrical system, Newton automatic voltage regulators are fitted in the fields of the main exciters and these, assisted by the design of the alternators themselves, ensure minimum voltage dip and rapid voltage recovery when the heavy starting currents and switching surges occur.

A great advantage of a.c. machinery is the smaller size of the motors compared with d.c. plant. The majority of the motors are 3-phase squirrel-cage induction types and range in size from 4·5 h.p. up to 178 h.p. Two-speed machines are used for driving the forced-draught fans, the boiler circulating pumps, bilge pumps and ventilation fans. With the exception of the 178-h.p. unit driving the boiler feed-water pump, all motors are started direct on line. The feed-water pump motor has an air-cooled auto transformer start.

Switchgear

The distribution system is all-insulated and runs at 440 V, but for lighting and small-power appliances this voltage is stepped down to 115 V by means of air-cooled transformers.

Due to the higher voltage, enclosed and protected switchgear is used mounted in cubicles of standard width, the main switchboard being 14 ft long. From this board, control is exercised over the 550 and 200 kW alternators, the port and starboard feeders and other distribution services. A synchronising panel is also included. Generator and main feeder circuit-breakers, of the withdrawable type, have a



One of the 550 kW, 450v 1,200 r.p.m., 3-phase, 60 c/s alternators is here seen with its main exciter

rupturing capacity in excess of 12 MVA, and the large breakers for the 550 kW alternators are electrically operated. Smaller breakers are manually operated. Special care has been taken to make maintenance access to the switchgear as safe and yet as easy as possible.

Other distribution circuits are controlled by on-load, quick make and break, fused switches which are interlocked with the doors.

Motor Starters

In addition to the main switchboard, two groups of motor starters are constructed in cubicles on similar lines to the circuit-breakers. The contactors, over-loads, back-up fuses and other components which might require attention are mounted on the front of the panels, while the isolating switch to each starter is fully interlocked with the cubicle door so that the latter can be opened only when the switch is in the isolated position.

The assembly of starters in multiple cubicles gives a very compact arrangement and reduces the number of feeder circuits, with associated fused switches or circuit-breakers, which would otherwise be required on the main switchboard. Although the starters are grouped together, the "start" and "stop" push-button for each motor is mounted on or adjacent to the motor, this being the most convenient arrangement for the engineers.

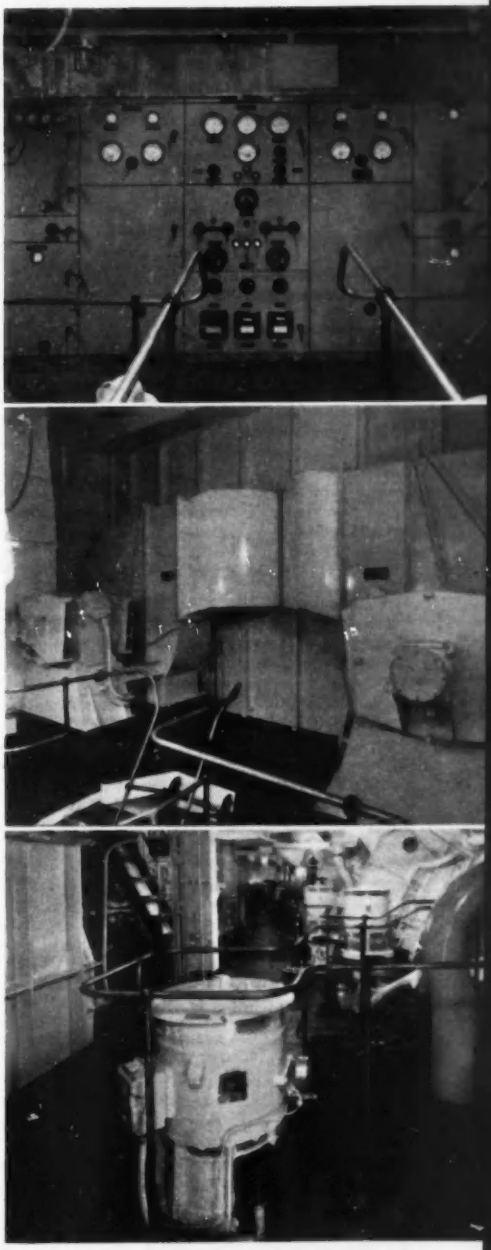
The greater part of the motors are enclosed, ventilated drip-proof machines with interchangeable terminal boxes and glands, and ball-and-roller bearings. The forced-draught fan motors, and turning and steering motors have plain journal bearings.

Other Electrical Equipment

For the main galley of the *San Florentino* the G.E.C. has supplied 440 V a.c. equipment that includes a two-oven range, a single-deck baking oven and a steaming oven, all with double-insulation oven elements, together with a grill, proving cupboard and five-gallon water boiler. In the pantries, two hot-cupboards, the small boilers and the percolators are operated on 110 V.

The G.E.C. has also supplied a number of Mutac switches, special interlocked switch plugs, cabin fans and other fittings throughout the ship, as well as cables manufactured by Pirelli-General Cable Works.

It is believed that a.c. machinery shows reduced maintenance costs and measurable savings may be expected on inaccessible and continuously-running machines such as axial flow fans which are mounted in ventilation trunking.



Top is shown the main switchboard, and centre are the 58/25 h.p. motors driving the forced-draught fans. At the bottom is the 56 h.p. motor driving the main circulating pump

overseas news

Power Survey

The Newfoundland Light and Power Co. is now conducting a survey of the power needs of the Burin Peninsula. The work has been undertaken on behalf of the Provincial Government, and is intended to ascertain what power supply is now needed for the Peninsula, likely future requirements, and the best method of meeting them. Electric light and power for the towns on the Burin Peninsula has been the subject of heated controversy for some years. The problem is not simple since the resources of the rivers on the Peninsula have not been determined, and power development might necessitate the use of long transmission lines. In that event it might be cheaper to install diesel plants, a Committee points out. The Company is presently making plans for the construction of what will be the highest dam in Newfoundland. Drilling has begun at Pipe's Hole, preparatory to the construction of a 30,000 h.p. hydro-electric station there.

B.C. Schemes

In addition to the Spillimacheen River power scheme, to which we referred on May 7, the British Columbia Power Commission has been authorised by the Provincial Government to construct another hydro-electric plant on the Puntledge River, near Courtenay, and to proceed with the damming of Buttle Lake. The Puntledge hydro-electric plant will have a capacity of 35,000 h.p., while the Spillimacheen scheme will develop 5,500 h.p. There will also be a 33 kV transmission line connecting the latter project to Golden and Edgewater. The order-in-council respecting Buttle Lake includes 12 special conditions for preserving the aesthetic value of the lake which were recommended to the last session of the Legislature by the special committee which investigated the dam proposal, and recommended that a dam be allowed.

Newfoundland Development

The Bill ratifying the agreement with the British and Newfoundland Corporation (in which the English Electric Co. have an interest) gives that concern exclusive rights over 60,000 square miles of potential mining area in Labrador and Newfoundland, and every h.p. of undeveloped hydro power in the island and its huge northern dependency, in addition to extensive timber reserves. The Corporation gets a 20-year option on all water power rights not granted or committed, plus an option on rights reverting to the Crown during the same period. Within 20 years the company may ask for full development leases for 99 years, renewable for another 99 years, but the lease can be cancelled if there is any delay in development. The Corporation has agreed to supply electric power to anyone asking for it, and, in addition to 8% of net profit before taxes, the company will pay the Province a further 50 cents per h.p. of developed hydro-power.

Electrification in Manitoba

The 1953 rural electrification programme of the Manitoba Power Commission calls for the addition of 5,000 farms in the Province at an average cost of $950 each. The Commission's programme for the next 12 months involves estimated expenditures of $9,367,000 of which $8 millions will be borrowed by the province and advanced to the Commission. It is hoped that by the end of this year the Commission will be supplying 39,000 farm houses, and that 75% of all farms in the Province will be connected. Farm electrification was started in the area on an experimental basis in 1945 with a try-out of 1,000 farms. After that it progressed on a larger scale and the last four years the programme objective has been 5,000 farms a year.

Belgian Electrification

Work has started on the conversion of the Brussels to Liege railway line to electric operation. Power supply will be obtained via the national network from four substations at Brussels Nord, Louvain, Landen, and Bierset-Awans, the last three being of the outdoor type of installation. For traction use the supply will be converted to 3·3 kV d.c.

Aid for Cape Town

In order to cope with the expected winter peak load on the "pooled" power stations at Cape Town during the months of May, June and July, the Electricity Supply Commission of South Africa has agreed to make available 20 MW of plant at its Hex River power station and to operate the additional generating plant required continuously during this period. If necessary, the assistance will be extended during August.

Cyprus Development

Plans are under way for an extension of the new power station at Dhekelia, Cyprus, we learn. The station, part of the island's electrification scheme, went on commercial load in February with the first two 7,000 kW Metropolitan-Vickers turbo-alternators, and much of the associated 66 kV primary grid system has also been put into operation. The initial stage also provided for the installation of a 14,000 kW machine, and discussions have recently taken place concerning the advisability of the further extension of the station. Electrifica-

tion of the island is now in the hands of the Electricity Authority of Cyprus (to which we referred on November 6 last) and which came into being on November 1, 1952, under the Electricity Development Law, 1952. Chairman of the Authority is Mr. J. L. Brown, who was director of Public Works there, the other members being Mr. G. Achilles, Mr. O. G. Chakarian, and Mr. N. D. Solomonides. An *ex-officio* member is to be the chief engineer and general manager, who has yet to be nominated. The Authority has been invested with very wide powers ranging from the acquisition of existing municipal undertakings to the making of regulations governing installations and electrical apparatus that may be used. Until recently the supply of electricity on the island was confined to a few municipalities and to installations owned and operated by several mining undertakings. Immediately on its formation the Authority acquired the undertakings of the Nicosia Electric Co., Ltd., and the Limassol Electric Light Co., Ltd., and on March 26 last the Larnaca municipal electricity undertaking was taken over.

Bombay's Plan

Bombay's Budget for the year 1953-54, presented by the Finance Minister to the Legislature recently, provides a sum of Rs. 497 lakhs for electricity schemes in the State during the year. There are in all 16 major works on hand, including the Koyna hydro-electric project, involving an aggregate capital expenditure of Rs. 4,719 lakhs (of which the Koyna scheme accounts for for Rs. 3,300 lakhs).

Expansion

At the annual meeting of the Broach Electric Supply and Development Corporation, Ltd., in Bombay recently, Mr. C. P. Wadia disclosed that it was proposed to place an order for a new set for the company's power house. To meet its expenditure and for the strengthening of the distribution system the company had decided to issue debentures, he added.

Production in Australia

In the past 25 years the number of factories in the Australian electrical industry had been multiplied by 4·6, the number of employees by 12·7, and the value of production by 39, Mr. N. C. Burgess, president of the Federal Council of Electrical Manufacturers, declared in his presidential address at the annual conference at Canberra earlier this month. Dealing with the growth of the industry in Australia from 1925 to 1950, he said factories had increased from 221 to 1,006, employees from 3,646 to 46,122, and the value of output (factory selling value) from £1,726,456 to £79,779,350. The value of production (value added by factories to material purchased) had grown from £976,567 to £38,006,376. The latest retail sales figures in Australia showed that electrical goods had reached 3·5% of the total retail sales of all goods. But Mr. Burgess was also concerned about the competition of British production in the Australian market. He maintained that the level of wages in Australia, which had been raised by 105% since 1946, had the effect of freezing local products out of competition with imported goods from Great Britain. Correcting the British wage rate into line with Australian currency, it was found that the Australian manufacturer must pay out £210 for every £100 which his competitor in the U.K. paid for the same amount of skilled labour, and £214 for £100 his British competitor paid for unskilled labour, he declared. In Mr. Burgess's view, no matter how efficient the Australian manufacturer was he could not overcome that handicap.

Traction Contract

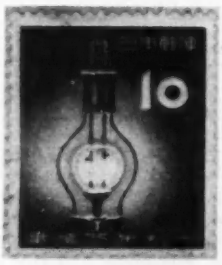
The Victorian Government is to place a contract with the Gloucester Railway Carriage and Waggon Co., Ltd., of England for the supply of 90 motors for new electric trains to be used on the Melbourne suburban network, according to the Transport Minister, Mr. P. L. Coleman. The value of the contract was A£1,338,192, he said.

More Records

For the State Electricity Commission of Victoria, 1952 was another year of progress, in which new records were again achieved in the generation and sale of electricity and in the number of new consumers connected, according to a recent summary. At the end of December last consumers connected within Victoria totalled 604,300, of which 457,100 were supplied retail by the Commission and 147,200 by municipal authorities taking a bulk supply from the Commission.

Celebrating Electric Lighting

To commemorate the 75th anniversary of the introduction of electric illumination in Japan, there has recently been issued in that country a special 10-yen postage stamp, a slightly enlarged reproduction of which is alongside. It is stated that "for one week the electric festival was observed throughout the nation under the joint auspices of the Government and civil organisations." There seems to be no suggestion that Japan is claiming credit for inventing the electric lamp, for the lettering at the bottom of the stamp can be translated as reading "to commemorate the passage of 75 years from the introduction of the electric lamp." Certainly authoritative records here state that Joseph Swan showed his first practical incandescent lamp in December 1878, although he had produced other examples in the previous year, while Edison was doing similar work in America. But in some people's view the idea of issuing such commemorative stamps might well be adopted by Britain.



PERSONALITIES

IN THE INDUSTRY

On June 20 next **Mr. P. Croom-Johnson,** C.B.E., M.Inst.C.E., London Transport's chief engineer, retires after more than 40 years in the engineering profession. His association with London's transport dates from 1924 when he joined London County Council Tramways as assistant permanent-way engineer. With subsequent promotion on the formation of the L.P.T.B. he took over responsibility for the ElectricalEngineeringDepartment in 1945, involving the operation of three generating stations and the distribution of power over London Transport's system, and was appointed chief engineer. Mr. Croom-Johnson was a member of the special committee set up in 1948 by the Railway Executive and the London Transport Executive which reviewed and reported upon the methods of electric traction employed on the railways and the system or systems to be adopted in future electrification schemes.

Mr. F. Croom-Johnson

Newly appointed manager for Brazil to the Metropolitan-Vickers Electrical Export Co., Ltd., is **Mr. F. C. Hallawell.** He succeeds **Mr. H. W. Foy,** who continues in an advisory capacity. That company has also appointed **Mr. E. E. Sarasa,** I.C.A.I.(Madrid), I.G.(Liege), A.M.I.E.E., as manager for Argentina, and **Mr. R. Morris,** D.F.H., A.M.I.E.E., is now technical representative in Colombia, Peru and Venezuela. For the present Mr. Morris will be located with the M-V. agent in Bogota, Colombia. Mr. Hallawell joined the M-V. Rio de Janeiro staff in 1937, but during the war he was seconded to the B.B.C. Returning to M-V. in 1946, he became commercial assistant to the manager for Brazil, and later Rio office manager. Mr. Sarasa served a college apprenticeship with M-V. and subsequently spent some time in the Motor Engineering Dept., and as a sales engineer in Industrial Control Sales Dept., at Trafford Park. In 1946 he transferred to the Buenos Aires office as sales engineer for the M-V. Export Co. Mr. Morris also joined M-V. as a college apprentice and in 1938 went into the Contracts Department. After service in the Navy, he joined the M-V. Export Co. in 1946 as assistant to the principal representative at Trafford Park works. Subsequently he spent some time in Switchgear Engineering Department and was then transferred to the American Division in London, where for over three years he was in close touch with the company's affairs in Latin America.

Mr. F. C. Hallawell

Mr. E. E. Sarasa

Mr. R. Morris

The Eastern Electricity Board is to merge more of its districts. In the Northmet sub-area the St. Albans and Welwyn Garden City districts are being merged and the present district manager at St. Albans, **Mr. R. A. Voit,** M.I.E.E., will be the district manager for the newly formed district. This move follows the appointment, as from June 1, of **Mr. C. E. Hollingsworth,** B.Eng., M.I.E.E., at present district manager at Welwyn Garden City, to a similar position at Stevenage, in succession to **Mr. J. C. Horrell,** A.M.I.E.E., who is going to the North Essex district as district manager, as from June 1. In the Board's Essex sub-area the Brentwood and Romford districts are also being merged, under the heading of South West Essex district, with **Mr. R. W. J. Benyon,** A.M.I.E.E., A.I.I.A. (now district manager at Romford) as the district manager. **Mr. G. H. Lawn,** Assoc.I.E.E., the present district manager at Brentwood is taking up a post at the Essex sub-area headquarters, we understand.

In charge of the City of Birmingham's public lighting for many years, **Mr. A. V. Blake** is to retire in July. He has been engineer in control of the Public Works Department's mechanical and lighting sections since 1919.

Mr. G. S. McNamara, the manager of the Commonwealth Division of Hoover Ltd., accompanied by **Miss Ruth Mercer,** an overseas washing adviser, left London Airport by Comet aircraft on May 26, to attend at Bulawayo the opening of the Rhodes Centenary Exhibition which takes place today, May 28.

Johnson and Phillips Ltd., announce the appointment of **Mr. David M. Hutton** as a director of their subsidiary company, British National Electrics Ltd. Mr. Hutton has been associated with B.N.E. for 20 years and has held the office of general manager for several years past.

Mr. D. M. Hutton

Mr. K. Higginson has retired from the position of publicity manager to the Dubilier Condenser Co. (1925) Ltd., a post which he has held for 19 years. We understand that he intends to act as a free-lance, and may be contacted at 332 Richmond Road, Kingston-on-Thames.

The Ministry of Supply announces that **Professor Sir Eric Rideal** is to be chairman of the Minister's Advisory Council on Scientific Research and Technical Development in succession to **Professor Sir John Lennard-Jones,** the chairman since 1947, who was recently appointed Principal of the University College of North Staffordshire. Sir Eric Rideal, who is Professor of Physical Chemistry at King's College, London, has been associated with research work of the Ministry of Supply since the early part of the last war.

Mr. M. W. J. Bull and **Mr. F. D. Opperman** have been appointed directors of Hubert Davies and Co., Ltd., the South African electrical engineering concern. Mr. Opperman has resigned his appointment as alternate director to **Mr. S. B. Evans.**

At the annual general meeting of the Electrical Development Association, **Sir Henry Self,** K.C.B., K.C.M.G., K.B.E., comp.I.E.E., deputy chairman (administration) of the B.E.A., was appointed president in succession to Dr. Percy Dunsheath. Subsequently, **Dame Caroline Haslett,** D.B.E., J.P., comp.I.E.E., a member of the B.E.A., and director of the E.A.W., was elected chairman, with **Mr. S. F. Steward,** C.B.E., M.I.P.E., chairman of the South Western Electricity Board, as vice-chairman.

Sir Henry Self

Dame Caroline Haslett

C. C. Wakefield and Co., Ltd., announce that their managing director, **Mr. Alonzo Limb,** has been elected to the additional post of deputy chairman.

Friends of **Mr. R. Bruce,** joint managing director of the Saxonia Electrical Wire Co., will be interested to hear that his younger son **Dr. Eric W. Bruce,** PH.D., D.I.C., B.SC.HONS(ENG.), A.C.G.I., A.R.I.C., has taken up an appointment at the Grasselli chemical department of E. and I. du Pont de Nemours and Co., at Delaware, U.S.A.

The Minister of Fuel and Power has appointed **Mr. J. C. M. Maclagan** (a director of Greenwood and Batley, Ltd.) as a part-time member of the Yorkshire Electricity Board.

OBITUARY

Mr. A. G. Deverill, formerly engineering sales manager at Loughborough to the Brush Electrical Engineering Co., Ltd., died on May 16, aged 72.

Mr. Walter Symes, manufacturing consultant to Associated Electrical Industries Ltd., died on May 18. It was only a year ago that he resigned from the board of the Metropolitan-Vickers Electrical Co., Ltd., and from the position of works manager at Trafford Park works. He went to Trafford Park from the B.T-H. Rugby works in 1914, and after making a study of manufacturing processes became assistant superintendent of the M-V. Process and Ratefixing Department on its formation. He later transferred to a manufacturing department on switch and control gear, as assistant superintendent, and in 1935 was appointed superintendent. He played a prominent part in expanding production of armaments during the war, and in 1944 was appointed works manager, Trafford Park works, and was afterwards largely responsible for the planning of the company's post-war extensions.

Mr. Walter Symes

Mr. T. Halse, B.A.,(Oxon.), A.M.I.E.E., research superintendent, Permali Ltd., died on May 17, aged 38. After gaining an Honours Degree in Physics, he joined the Research Department of the Dunlop Rubber Co., Ltd., and subsequently went to Permali Ltd., in 1943 to take charge of the rapidly expanding research and development laboratories. Mr. Halse was only recently re-elected chairman of the Western Section of the Plastics Institute.

Mr. N. Hosgood, M.I.E.E., formerly of the Eire Electricity Supply Board, died on May 19. At one time he was assistant engineer in the Pembroke (Dublin) area of the Board.

MANAGEMENT AND MAINTENANCE

Incorporated Plant Engineers meet at Southport

MANAGEMENT was the theme of last week's Conference of the Incorporated Plant Engineers, which was held at Southport from May 20 to 22. It provided a subject, too, for Mr. J. C. Veale, the new president, when he delivered his inaugural address on the Thursday. Mr. Veale, who is shortly to join J. Bibby and Sons, of Liverpool, as works engineer, is taking up the presidency in the place of Mr. J. C. Tremayne, who has unfortunately been prevented by illness from accepting that office.

Mr. Veale pointed out that it is by management of his men that the engineer in charge brings about the improvements which his technical skill suggests. He added that management of those senior to the engineer may be necessary too, a more difficult task, because of the lack of relevant authority.

Necessary Qualities

To the plant engineer, the essential attributes for sound maintenance are practical and technical ability and a strong personality. Not everyone possesses these to the same extent, but there are other qualities which everyone can show merely by the application of effort and self-discipline. These are loyalty, conscientiousness, determination, sincerity and enthusiasm, and they are as essential for sound management as the qualities mentioned earlier. Developing such characteristics increases the estimate of the plant engineer's value to his employers by making his management more effective.

A similar theme was taken up by Mr. E. J. Parish (director and managing director, Renold and Coventry Chain Co.) in his paper "Management and the Plant Engineer." In the course of his consideration of this subject Mr. Parish dealt with the plant engineer as manager of his department, and with general management. His conclusions are summarised in a specification for the production of a good manager of a plant and maintenance section. He must be a good plant engineer, with both practical and theoretical training; and he must have undergone training in management by actually doing an executive job and by attending suitable courses in industrial administration.

Later, on Thursday, members joined in four discussion groups which dealt briefly with some topical points concerning plant engineering. Amongst them were two of particular interest to electrical maintenance engineers. The first dealt with the Productivity Report on Plant Maintenance, and was opened by Mr. Colin Troup, the secretary of the team which visited the United States. He emphasised that the report is not intended to teach plant engineers their job, but rather to promote by example a critical examination of the production and maintenance requirements of individual plants, followed by an assessment of the form of organisation best suited to meet these needs. Of the various sections of the report, he laid most stress on the aspects covered by "The Management Approach to Maintenance."

Costs

Introduced by Mr. E. C. Stevens, the other discussion was concerned with "The Plant Engineer and Costs." Mr. Stevens gave many reasons that make it necessary for the plant engineer to be cost conscious. Amongst them he included the possibility of arranging meters in a way that gave satisfactory technical information, and at the same time facilitated the extraction of useful cost data that can be related to production.

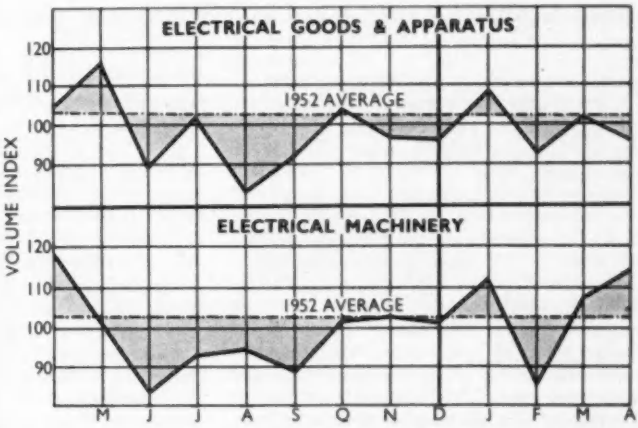
The factory budget is based on facts for many of which the cost accountant is obliged to approach the plant engineer. He alone is in a position to estimate certain plant costs such as light, heat, power, ventilation, building maintenance and so on. In Mr. Stevens' view these present the plant engineer with his most difficult problems in connection with cost accountancy. In order to produce accurate estimates the plant engineer must have access to past records; he must be familiar with the present condition of the plant; must be aware of the policy for the future, and be well gifted with clairvoyance!

On the last day of the conference, which dealt with other papers than those mentioned, the Alexander Duckham Memorial awards were presented to Mr. G. E. Halter (silver medal) and Mr. G. W. Campbell (bronze medal). Afterwards the prize-winning papers on "Heat Exchangers—Maintenance and Reconditioning" and "Transportation" respectively were discussed.

EXPORTS AND IMPORTS

The previous month's rise in the exports of electrical goods and apparatus was not maintained during April, due probably to Easter. The extent of the fall is indicated by the "Electrical Times" volume index, whose value for April is 96, compared with 102 previously, both based on 1950 as 100. In value, this class of exports were £8,596,909.

A brighter picture is shown in the exports of electrical machinery, where the rise during March was maintained, though not to the same extent. Here the volume index of 114 is 4 points above that for April, on the 1950 equals 100 basis. £6,007,710 was the value of electrical machinery exported.



APRIL brought a further improvement in the value of all electrical goods exported, this despite the fact that the month contained only 24 working days compared with an average of nearly 26 in the first quarter of this year. True the total for April was only £143,005 up on the previous month's figure, but it is a steady improvement which is all the more encouraging in view of the import restrictions on some domestic appliances by certain countries.

In addition to our table, complete electric washing machines not exceeding 150 lb in net weight to a total value of £173,502 were exported, together with £106,404 worth of the larger machines. In addition, portable electric tools to a value of £116,196, were sent abroad.

Description	Exports Value Month of April			Imports Value Month of April		
	1951 £	1952 £	1953 £	1951 £	1952 £	1953 £
Telegraph and Telephone Wires and Cables—						
Submarine	71,315	4,260	32,690	—	—	—
Other	700,955	645,573	603,302	—	—	—
Rubber Insulated	498,173	791,984	397,679	—	—	—
Insulated, other than Rubber	872,182	1,182,387	718,970	—	—	—
Wireless Apparatus, including Valves	1,785,185	1,943,443	2,098,357	264,711	329,532	336,562
Telephone and Telegraph Apparatus	1,151,572	1,369,668	1,511,152	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament Lamp Bulbs	138,836	148,190	99,578	15,566	14,913	9,013
Other Descriptions	401,674	453,005	443,079	35,486	26,225	19,983
Batteries (primary)	214,102	200,157	213,113	—	—	—
Accumulators, Portable	347,870	335,125	212,554	—	—	—
,, Stationary	71,359	63,425	47,443	—	—	—
,, Parts and Accessories	74,754	98,813	52,379	—	—	—
Electrical Cooking and Heating Appliances	400,484	577,264	257,035	—	—	—
Ammeters, Voltmeters, etc., and Parts	121,007	150,635	127,488			
House Service Meters	141,128	202,175	79,206	33,689	44,091	72,248
All Other Instruments	140,430	103,180	145,795	—	—	—
Electro-Medical Apparatus	56,619	45,752	31,118	—	—	—
X-Ray Apparatus, etc.	160,668	120,418	112,483	19,993	31,524	38,744
Insulating Materials	210,468	218,474	120,885	—	—	—
All Other Articles	597,476	649,048	667,099	111,267	192,559	98,856
Total of Group	8,326,709	9,251,351	8,596,909	480,712	638,844	575,406
Electrical Machinery:—						
Generating Sets, Diesel (not exceeding 200kW)	350,555	514,787	324,346			
,, ,, ,, (exceeding 200kW)	151,088	295,074	77,279	33,628	62,994	26,507
Other Generating Sets	241,282	92,126	860,592			
Generators minus Prime Movers and Parts	385,368	616,822	801,097			
Motors	918,765	1,142,335	815,223	37,433	56,550	36,867
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	2,472,062	2,987,290	3,129,173	10,195	19,755	93,045
Fans, Electrically and Power Driven	184,431	229,792	208,433	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	459,337	426,229	336,390	—	—	—
Total Appliances and Machinery	13,489,597	15,555,806	15,149,442	561,968	778,143	731,825

New Outdoor Switch Fuse

Ring Main Unit introduced into manufacturer's Switchgear Range

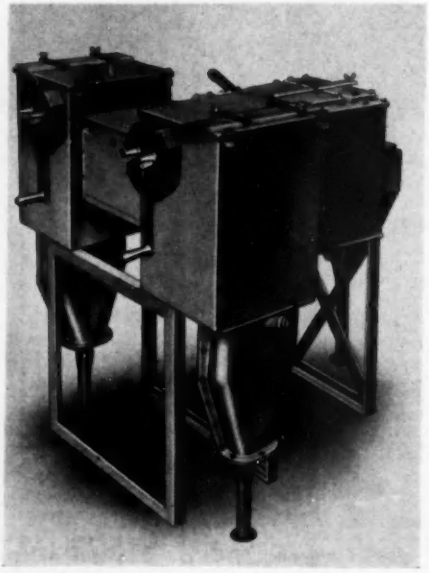
NEW addition to the extending range of switchgear manufactured by Ferguson Pailin Ltd. is the 11 kV outdoor fuse-switch ring main unit illustrated below. This comprises a type "OFS" oil-immersed fuse-switch which can be fitted with two cable boxes and mounted individually or, as an alternative, fitted with ring main oil-immersed switches on each side.

Short circuit rating of the unit at 11 kV is 250 MVA, 3-phase, while the current rating of the fuse-switch is 200 amps. The wing oil switches are rated at 400 amp. When the fuse-switch was tested in accordance with the appropriate A.S.T.A. rules, it performed successfully. For the purpose of the tests, fuse links manufactured by Electric Transmission Ltd. were used.

Construction

The fuse-switch has a welded steel tank with a hinged access cover, and is supported on a fabricated angle iron framework. Fuse links are contained in tubular carriers with contacts at each end, the 3-phase assembly being operated by a self-contained spring-loaded mechanism.

Below is seen an 11 kV oil-immersed fuse-switch unit type OFS



Operation of any single fuse actuates tripping levers and opens all three phases. After operation of a fuse link, any attempt to reclose before the blown link has been replaced trips the mechanism before the switch makes contact. The fixed contacts are carried on bushings which project into the cable box, the latter being attached to the tank and fitted with a gland plate and removable cover.

Full interlocking is provided, so that only with the fuse-switch in the "off" position can the hinged cover be opened. In this state the mechanism is held tripped and the fuse-carriers project through apertures in an earthed metal screen to permit inspection of the fuse links and upper contacts.

Oil Switches

At each side of the switch-fuse, if required, there are oil-immersed switches, and these are of the quick-break type, operated by a captive handle. The associated mechanism can be locked in "on", "off" or "earthed" positions, and there is provision for preventing inadvertent operation from the "on" to the "earth" setting. Other interlocks prevent the last orifice being opened with the switch in any position other than "earth", while opening the test cover does not remove the cable earth but locks the switch in the "earth" position. A current/potential testing device is provided which when inserted allows the switch to be operated only to the "off" position, automatically locking the device in the spouts and connecting it to the cable contacts.

Another recent Ferguson Pailin development is an improved design of medium voltage cartridge fuse link, which is available in standard current ratings 2-300 amp. Extension up to 300 amp rating is expected shortly. In the method of construction now used, the end caps of the fuse are stated not to form part of the electrical circuit. Indicators are provided to show when the fuse has operated.

The fuse links consist essentially of a ceramic barrel filled with fine grade silica sand, and has end caps and silver fuse elements of conventional design. The fuse links are A.S.T.A. certified to comply with B.S. 88/152.

The BUYER'S *Column*

An 8 qt. Electrochurn

DESIGNED for the small producer wishing to make a small quantity of butter weekly, the new Electrochurn Minor has a capacity of 8 quarts and permits the churning of cream or good milk from the second day.

Butter is made, washed and salted in this unit marketed by the CHURN Co., Station Road, Hailsham, Sussex, at £15 10s., complete and ready for use with special perforated strainer, on normal a.c. voltages.

Fully guaranteed for one year, the Electrochurn Minor is not subject to purchase tax. It weighs (net) 16½ lb, and is also available for d.c. supplies 12-250 V.

Double-Duct Rising Main System

A NEW rising main system (British Patent No. 682513) employing double ducts, has been developed by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. Although similar in construction to the Company's standard totally enclosed vertical rising main, it has a number of added advantages. It facilitates load-balancing, floor by floor, and gives complete flexibility of service.

To ensure a neat overall installation there are two separate wiring ducts within the steel casing, one on each side of the copper rising main. These are provided for sub-circuit cables which run from plug-in distribution fuse boards to points where lateral conduits connect with the trunking in the floor thickness.

Special semi-recessed distribution boards "plug-in" direct to the face of the rising main at predetermined positions. The fuses are mounted on an insulating panel, on the back of which each row of fuse units is strapped by a copper busbar with a projecting brush-type laminated pressure contact. Slots are provided at either side of the board to enable circuit cables to be passed direct into the channel ways for feeding lateral distribution.

Each fuse board can provide local distribution for the floor on which it is situated, or may serve three floors, i.e. above, centre and below. Each board can be effectively sealed and used as the Supply Company's cut-out, between supplier and consumer. They may be arranged for either S.P. and N., D.P., T.P. or T.P. and N. systems as required.

Westool Series "L" Solenoids

LATEST additions to the wide range of solenoids both d.c. and a.c., which are manufactured by WESTOOL LTD., St. Helens, Auckland, Co. Durham, are the series "L" pull and thrust types. One application of these small solenoids is in the control of jet engines in aircraft, but their uses in industry are numerous.

A series "L" solenoid

Wound for 6-440 V d.c. and allowing a maximum stroke of 2 in. either pull or thrust, these solenoids are strongly built and allow for universal mounting; they have terminal block connection and interchangeable vacuum impregnated coils.

The solenoid is available in three different models 1, 2 and 3, which should be selected to give the necessary performance, but refer to the company's leaflet 23/52 on these solenoids.

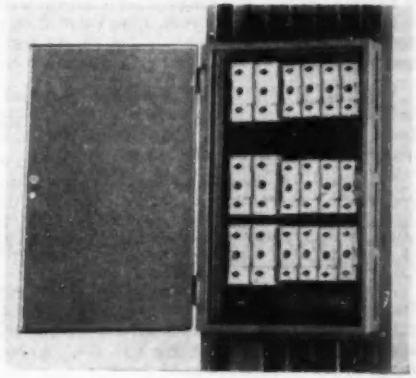
Overall length is 4 $\frac{9}{16}$ in. plus the length of the plunger when sealed, which ranges from 1 $\frac{1}{4}$ in. to 2 $\frac{7}{32}$ in. overall width including terminal block 2 $\frac{3}{4}$ in.

The Falco "Royal" cooker

AN outstanding example of the new ideas in design which are apparent in the cookers introduced in this Coronation year is the appropriately named "Royal" cooker which has been presented by FALCO ELECTRICAL APPLIANCES LTD., Corporation Rd., Audenshaw, Manchester.

This new model has outstanding features. The cooking controls have been grouped on the back panel splash plate and a 60 W tubular lamp

This distribution board "plugs in" direct to the face of the rising main in the new G.E.C. system



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fitted in the centre. The spacious hob houses two 8 in. radiant hotplates rated at 1·6 kW each and a 6½ in. diameter, 900 W plate at the back. The large grill chamber which has a 3 kW element controlled by three-heat switch takes a large grill pan sliding on runners. The oven, dimensions 16½ in. high by 17½ in. wide by 15½ in. deep, is finished in white vitreous enamel as is the exterior of the cooker. Interior parts are removable in sections for cleaning, whilst the dull chromium grids can be drawn forward without tipping. A photograph of this cooker will appear in our next issue.

Nife-Neverfayle 'Minor' Sets

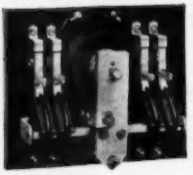
AN entirely new range of self-contained automatic emergency lighting equipments for small to medium sized buildings, such as hospitals, schools, institutes, hotels and small factories, is now in production at the works of NIFE BATTERIES, Redditch, Worcs.

Known as the Nife-Neverfayle "Minor" series, these sets can be supplied for either maintained or non-maintained systems.

These "Minor" units are housed in robustly constructed steel cubicles, the lower compartments containing the 12, 25 or 50 V batteries and the upper, the control gear and instruments. The smaller types are either bench- or wall- mounted, whilst the larger models stand on the floor.

The spring-controlled contactor in the control mechanism, is based on an ingenious new design evolved to ensure satisfactory operation during those occasions when the mains supply voltage is sub-normal. The coil of the contactor operates in conjunction with an economy resistance fed by direct current from a full wave, bridge-connected, selenium rectifier to ensure silent operation and simplicity of construction.

The contactors are set to work in conjunction with the usual metal filament lamps, but the design is such that they can be arranged, if necessary, to work in conjunction with fluorescent tubes.



This is the new type contactor

The output of the rectifier is such that a completely discharged battery can be recharged in approximately 14 hours.

TRADE PUBLICATIONS

SAFETY LIGHTING.—New leaflets describe "Safetylyte" "Major" and "Minor" emergency lighting equipment—Tudor Accumulator Co., Ltd., 137 Victoria St., S.W.1.

LINE FITTINGS.—Aluminium overhead distribution line fittings are featured in list BH50 issued by Bowthorpe Electric Co., Ltd., Tinsley Lane, Crawley, Sussex.

ACCESSORIES.—A leaflet describing the complete range of 13-amp. plugs, sockets and installation accessories, is now available from M.K. Electric Ltd., Wakefield Street, London, N.18. Also available is a handbill 224 describing the company's watertight 5-amp. a.c. tumbler switch, and new flush steel socket outlet boxes.

LAMPHOLDERS.—The range of brass lampholders made by Rainsford and Lynes, Ltd., Emily Street, Birmingham 12, is featured in leaflet No. 55 available from the firm.

LIGHTING FITTINGS.—An aluminium alloy bulkhead fitting with prismatic glass, which is available from Revo Electric Co., Ltd., Tipton, Staffs, is described in a leaflet available from the firm.

WELDING.—A comparator for mild steel metal arc welding electrodes has been designed by the British Welding Research Association, and is available, price 5s., from the Association at 29 Park Crescent, London, W.1.

ACCESSORIES.—Leaflets published by The Edison Swan Electric Co., Ltd., 155 Charing Cross Road, London W.C.2, described the Ediswan "Windsor" range of 13 amp accessories, and the "Avon" range of a.c. slot switches.

GAUGES AND TOOLS.—Lists of cap gauge blank for machining to required dimensions, and of "Manchester" special calipers, are available from Manchester Metal Works, Ltd., 368-376 Bury New Road, Salford 7, Manchester.

PIPEWORK.—A leaflet introducing a specialised engineering service—the fabrication of pipework—is available from Pipework and Engineering, Ltd., 115 West St., Bedminster, Bristol.

POWER SUPPLY.—New brochure "High Voltage Capacitors" and "Type TR Rectifier Equipments" now available from Standard Telephones and Cables, Ltd., 63 Aldwych, W.C.2.

ALUMINIUM ALLOYS.—"Kynal" and "Kynalcore" alloys are described in a brochure by Imperial Chemical Industries, Ltd., Millbank, S.W.1.

CONDUIT FITTINGS.—New price list for all Blaco conduit fittings to be used in conjunction with illustrated list.—F. C. Blackwell and Co., Ltd., Gt. Crosby, Liverpool 23.

METAL TREATMENT.—Latest issue of the "Bonderizer" features articles on Electrolux refrigerators and Parmelco neon transformers.—Pyrene Co., Ltd., Gt. West Rd., Brentford, Middx.

MOTORS.—Two new brochures give details of the firm's larger output motors and their range to draft B.S. N(ELE) 6814.—Newman Industries, Ltd., Yate, Bristol.

RESIN PRODUCTION.—Bulletin No. 124 of Aero Research Technical Notes deals with resin production at the company's Duxford headquarters.—Aero Research, Ltd., Duxford, Cambridge.

The WEEK in NEWS

Companies Reject Tariff Terms

New Moves in Eastern Board Consumers' Representations

ALLEGATIONS that the Eastern Electricity Board has been guilty of a "startling departure from the accepted method of conducting business" are made in a statement issued jointly last week by Associated Portland Cement Manufacturers, Ltd., and Enfield Rolling Mills, Ltd. The complaint is made regarding representations by two companies to the Eastern Electricity Consultative Council, arising from dissatisfaction with new tariff agreements offered by the E.E.B.

Details of the Consultative Council's report on these representations were given in the ELECTRICAL TIMES last week, together with the E.E.B.'s reply to this report. Now the companies are complaining that they only learned of the new proposals from the Press; that the Board had allowed to be published correspondence between itself and particular consumers; and that it declined to appear before the Consultative Council when the representations of the companies were heard. They further claim that in its reported offer of new terms the Board ignores most of the recommendations of the Consultative Council. One recommendation, they say, would mean a saving to Enfield Rolling Mills Ltd., of £2,000 a year; the equivalent concession offered by the Board is alleged to amount to £120 only. The statement by the two Companies concludes with a note of their intention to "summarily reject" the new terms if they prove to be the same as those published in the Press, and to continue the fight to secure the terms recommended by the Consultative Council.

As readers of our previous notes on this case will be aware, the Eastern Board only declined to appear for a hearing at which Enfield Rolling Mills were represented by counsel. The stated reason was that it did not seem likely that they would have any further information to give to the Consultative Council's sub-committee. Further, no documents concerning this case were issued to the Press by the Board. Those quoted were circulated, at the normal public meeting of the Eastern Electricity Consultative Council.

Govt. Appoints Iron and Steel Board

THE names of the new Iron and Steel Board appointed by the Government as part of their denationalisation plans were announced last week by the Minister of Supply. According to the Act the Board should consist of between 10 and 15 members. So far 11 have been named, three of which are whole time members. Among the part-time members are two who will be readily recognised by the electrical industry. They are Mr. N. Rollason, managing director of John Summers and Sons, and Sir Percy Lister, chairman of R. A. Lister and Co. Each will receive £1,000 p.a.

START MADE ON 1954 ELECTRICAL EXHIBITION

DESPITE the fact that next March still seems a long way off, plans are already being laid for the third Electrical Engineers Exhibition, which will again take place during that month. A statement issued by the organisers, the A.S.E.E., last week referred to preparatory work which was proceeding in connection with the 1954 show. Many requests have been received to increase the size of the exhibition and the number of stands available. The exhibition committee are drawing up provisional estimates, and we understand they will communicate with all those manufacturers and others who are interested in the near future.

Welsh Power Board

ANOTHER appeal has been made to treat Wales as a separate entity for the purpose of electricity supplies. At a recent meeting the Glamorgan Association of Parish Councils passed a resolution requesting the formation of a Welsh Electricity Board. Copies of the resolution are to be sent to the Minister of Fuel and Power and to the secretary of the Welsh Parliamentary Party. Secretaries of all Welsh county associations of parish councils will also be notified in an endeavour to gain further support.

The First Half-Century

The thawing of frozen pipes by electricity is an application of electricity that has been made in the United States within the past five years, having been first introduced at Madison in 1899, and later in other northern cities. A frozen gas-service covered with several feet of frozen ground is a serious matter; but it has been demonstrated that, by passing an electric current through the pipe, it can be quickly heated to a temperature sufficient to melt the water within it.—*From our issue of May* 28, 1903.

Following last week's photograph of a Sunbeam-British Thomson-Houston trolleybus in Brisbane, we hear that orders for similar vehicles have been placed by the towns of Georgetown, Penang, and Coimbra, Portugal. Both places have already these trolleybuses, and one at Coimbra is shown in service in the above picture. Latest orders are for seven vehicles for Georgetown and three for Coimbra

Coal Council Plan has been Completed

VIRTUAL completion of the development programme adopted in 1949 is claimed by the Coal Utilisation Council in its annual report for 1952. A service and showroom scheme has been soundly established to boost the merits of electric fires, and a great expansion in every aspect of the Council's work has, it is claimed, been successfully carried through. Now the Council is to consolidate by continuing to extend its work along four main lines: publicity for the advantages of solid fuel; stimulation of the coal and appliance users to give the best possible service to the public; training facilities; and the provision of technical advice for the trade and those professionally concerned with domestic heating problems.

During the period covered by the report the Council was able to carry through its first full year of national advertising. It opened four new information centres for the advice of the general public and finalised plans for three more. An experimental scheme to provide solid fuel cookers for school housecraft rooms has been financed.

Cable Exports to South Africa

IT has been reported from South Africa that the Union Tender and Supply Board intends to prepare a list of approved tenderers for the supply of p.v.c. insulated and p.v.c. sheathed indoor cable to the Department of Posts and Telegraphy. Manufacturers in this country interested in the S. African market are advised to apply as early as possible to the Controller of Post Office Stores at P.O. Box 447, Pretoria. We understand that after compiling its list of approved tenderers, the Department's requirements for this type of cable will be obtained only from approved manufacturers, and consequently those interested should apply for inclusion in that category.

OFFICIAL PUBLICATIONS

OVERSEAS ECONOMIC SURVEY. British E. Africa (see page 1019). H.M.S.O. 5s.

CENSUS OF PRODUCTION. Report for 1952. Introd. Notes. H.M.S.O. 1s. Vol. 4: Engrng., Shipbuilding and Electrical Goods. H.M.S.O. 2s. (See page 1005).

PATENTS, DESIGNS AND TRADE MARKS. 70th Report of Comptroller-General for 1922 (see page 1002). H.M.S.O. 1s. 3d.

ACCIDENTS IN THE HOME. Report of Standing Interdepartmental Committee (see page 1020). H.M.S.O. 6d.

BRITISH STANDARD. B.S.801: Lead and Lead Alloys for Cable Sheathing.

MONOPOLIES COMMISSION. *Sixth Report from Select Committee on Estimates.* (See page 1004.) H.M.S.O. 3s.

1953 CONFERENCE OF THE A.S.E.E.

THE result of discussions between the A.S.E.E. and I.E.E. regarding changes made to allow the fullest development of the Association's work for the further education of engineering technicians, was given at the A.S.E.E's annual conference at Leeds. The I.E.E., it was stated, had expressed satisfaction at the changes in a letter. Future liaison with a new Association Committee on Education and Training, for technicians in the utilisation field, was mentioned, and facilities which the Institution would extend to A.S.E.E. members were referred to. The letter concluded with the hope that the new collaboration would be of mutual benefit and that the development of educational work would be successful.

Among domestic matters considered, the conference decided to modify rules to extend associate membership to all supervisory grades of engineer and technician in the electrical industry. The scope of the Employment Bureau is also to be widened.

Threat to Complain to the Minister

FROM time to time we have reported the activities of the comparatively newly formed Gas and Electricity Users' Association at Bournemouth. Their opinion of the Area's Electricity Consultative Council is not apparently too good and at their recent meeting the chairman commented "there is a feeling by the public that the Consultative Councils are no use at all." The Association is threatening to complain about the Councils to the Ministry of Fuel and Power, chiefly because it is alleged that they will not pay any attention to representations made to them by the Association. The meeting was the Association's first annual meeting. The Consultative Council has stated they could only forward the Association's request for further information if they felt something was wrong.

Searching for Natural Gas in Gt. Britain

A LARGE-SCALE exploration for natural gas in this country is to be conducted by the Gas Council, Sir Harold Smith, chairman, stated in London last Thursday. The survey is expected to extend over about five years. Speaking at a meeting of the Institution of Gas Engineers, Sir Harold said the proposal was made last year, and it was eventually decided to go ahead with the project following expert advice submitted to them by an eminent geologist.

There was no guarantee that gas would be found in a commercial quantity, but the chairman said it was important to remember that hitherto the object of borings was to find oil, and no serious attempt had been made to discover gas. If the search is successful, the benefit to gas consumers will be substantial, and, of course, the electrical industry will be faced with new competition.

OPEN DAY

TWO London power stations will be open to the public on the evening of June 3. They are Blackwall Point and Deptford, and hours of opening will be between 6 and 9 p.m.

E. Midlands Board's New Standard Tariff

NEW standard tariffs for farms, commercial and combined premises, to apply from September 1, are announced by the East Midlands Electricity Board. The combined premises tariff, applying to all premises used partly as a dwelling and partly for any business, is a block tariff. Under this the first block of units charged at 4½d. p.u. is based on a combined assessment of dwelling rooms and floor area of the business section. All excess units will be charged at 1d. p.u. For farms the unit charges are the same, the first block of units being assessed on the number of rooms in the farmhouse and the size of the farm.

For commercial and miscellaneous premises there is an M.D. tariff with a low unit charge including a coal clause, or, for smaller consumers, a block tariff which has three steps: 4½d., 2d. and 1d. Here the number of units in the first block depends on the type of premises and its floor area. The second block of units contains twice the number of the first, charged at 2d., with all in excess at 1d. p.u. Alternatively, consumers can take their supplies on the flat rate tariff—5d. p.u. for lighting and 1½d. for other use.

Other tariff news this week is that the South Eastern Electricity Board is announcing details of its standard domestic two-part domestic tariff.

Rectifiers for the Netherlands

NETHERLANDS Railways have placed several orders in this country since the war for pumpless steel-tank rectifier equipments as part of their reconstruction programme. Recipients of these orders were the General Electric Co., who have recently received yet another order for two 1224kW 1500V units. This is understood to bring the capacity of G.E.C. rectifiers in service on the railways to nearly 30,000kW. In terms of cash the orders total about £100,000.

OFF-PEAK POWER TO HEAT HEALTH CENTRE

ELECTRIC floor and wall heating panels have been incorporated in the recently built Sighthill Health Centre in Edinburgh. Thus the whole building will be heated by off-peak electricity and arrangements have been made for power to be switched on automatically during these daily periods. In very cold weather it will be necessary to give the heating a boost in the middle of the day. The floors of the new health centre are of solid concrete, and partitions and the inner leaf of external cavity walls are of 4 in. foamed slag concrete blocks. Wall panels have been backed by heat reflecting material.

Cable Advertisement

SIEMENS Electric Lamps and Supplies have asked us to note that due to a misunderstanding their advertisement on page 22 appears in its present form without the approval of the Clunie station authorities. The firm tenders its apologies and states that the error will be rectified in future advertisements.

Electrical Progress in East Africa

PROBABLY the most important factor in the Overseas Economic Survey of British East Africa, just published, from the electrical viewpoint, is the Owen Falls Hydro-Electric scheme. Work on the project is up to schedule and power is expected to be available by 1954. Much of the development in Uganda both in the electrical and other fields depends largely on this project, and much the same can be said in respect of Kenya, Tanganyika and Zanzibar, also covered by the survey. In all these countries considerable progress is being made in the development of electrical services. The rapid expansion of electricity plant and distribution schemes should ensure a steady market for equipment, and this will in turn lead to an increasing market for consumer goods. Apart from Uganda, U.K. business prospects are bright in Zanzibar where much of the existing plant is old and almost beyond economic maintenance. In Kenya and Tanganyika surveys are in hand for several hydro-electric projects of considerable size.

On the domestic side it is of note that there has been a shortage of refrigerators, which are so important in East African homes. The market is also likely to expand further in respect of other appliances, such as washing and ironing machines, batteries, torches, electric light fittings and lamps.

Lighting Our Homes for Safety

Higher standards of illumination could prevent accidents

INADEQUATE lighting is an important factor in causing accidents in the home. It particularly affects falls, which when totalled from all causes account for 58% of the 6,000 or so people who die each year as a result of an accident on domestic premises. It is not only the level of illumination that counts for such factors as adequate provision of two-way switching on stairs is important.

This call for better lighting is made with force in "accidents in the Home" recently published by the Stationery Office as a report of the Standing Departmental Committee which keeps watch on this subject. The report emphasises that the two most important causes of accidents in the home are faulty design and equipment and, in the broadest sense, human frailty. Of the two it is the human element that is most important.

It is significant that the usual electrical risks escape mention amongst the commonest type of fatal accident, although coal gas poisoning figures at 8%. The introduction of regulations for the compulsory guarding of electric (and other) fires should improve the record still further. In a list of common causes of accidents, flex looped across a floor and electrical apparatus in bathrooms are mentioned as undesirable. Although electrical apparatus in general is given as a leading cause of fires in buildings (18% of the total) it is noted that over half the fires so classified are attributed to cookers, usually where food has been heated for too long.

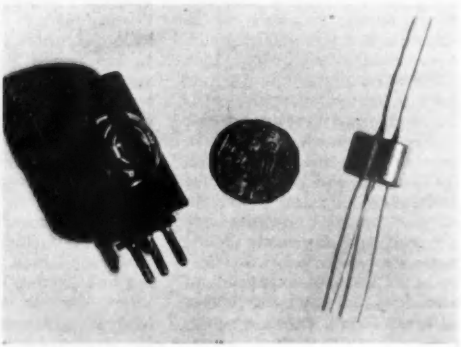
Revised Classification

WE have been advised by the Joint Industrial Council for the Electrical Cable making Industry that the occupation of "Finishing Telephone Cords," appearing under Occupation 16 (Miscellaneous) should be regraded at Classification 2. The revision has been made on the understanding that it be without prejudice to the classification of other occupations in the schedule applicable to women workers. The revised classification became effective on the third pay day in May in respect of the period for which payment would then be made.

Germanium Transistor for Hearing Aids

A NEW device which can be used with most deaf aids to extend the range of hearing by providing a higher maximum amplification and power output has been put on the market recently. It consists of a simple attachment which relies on a germanium crystal triode transistor of the point contact type made by the G.E.C. Sound given by a deaf aid is amplified about 30 times more when operated from a 22½ V battery. This is probably one of the first British commercial devices incorporating a germanium crystal triode and it is being demonstrated at present at an exhibition organised by Multitone Electric Co., Ltd., at 25 Dover Street, Piccadilly, W.1. The exhibition will be open until Saturday.

The attachment is plugged into a battery and has two leads, one to the aid and the other to the earpiece. It can be operated from batteries of between 9 V and 45 V, and will cost six guineas.



Multitone range extender incorporating point-contact germanium crystal triode, which can be used to improve hearing with most hearing aids

NEWS IN BRIEF

Swale (Kent) are to install electricity in all pre-war council houses providing for a lighting point in all rooms, and three power points including one for a cooker.

Enfield Cables, Ltd., have asked us to point out that the photograph used in their advertisement on page 69 of coronation lighting in The Mall was Crown copyright and reproduced by permission of the Ministry of Works.

Derby Electrical Society is appealing for new members to make the number up to 300. It was founded with 22 members, rose to 300 and present membership is about 160.

If the Eastern Board's policy, and the amount of capital available, remains the same, Skeyton and Swanton Abbot will be given an electricity supply in 1954-55.—Mr. J. A. Sumnor, sub-area manager.

A party of Venezuelan Press representatives visited the Strowger works at Automatic Telephone and Electric Co. Ltd., recently, and toured the factory.

In our note on the cooker competition of British National Electrics Ltd. (May 14 issue, page 929), we reported the fact that well over 10,000 entries were received. While this statement was perfectly correct, the number of entrants was stated to be "well into five figures," and was in fact considerably above 10,000.

Questions in Parliament . . .

Hire Purchase

President of the Board of Trade stated he did not intend to withdraw the Hire Purchase and Credit Sale Agreements (Control) Order.

Smoke Abatement

Replying to a question last Thursday, Miss P. Hornsby-Smith said it had been decided not to recommend that a grant be made to the Smoke Abatement Society to assist them in their work on the air pollution problem. The questioner, however, suggested this was an unsatisfactory answer in view of the many deaths resulting from air pollution. He was reminded that the Government had set up a special committee to investigate the matter and were far more likely to achieve the results required.

Monopolies Commission

Giving some facts about the Monopolies Commission, Mr. P. Thorneycroft said at present there were 25 members of the Board of Trade seconded to the Commission.

Purchase Tax

When Clause 8 of the Finance Bill, dealing with relief and reduction of purchase tax on certain goods, came up for debate last week, Mr. D. Jay said it was not proposed to press the matter at that stage, on the understanding that the whole issue of P.T. would be fully debated on Clause 9 later. The clause gives effect to the First Schedule and deals with electric vehicles. Mr. Maudling said the discussion on purchase tax would take place after the recess, and the passing of Clause 8 would not prejudice subsequent discussion.

Technological Education

The question of technological education was raised in an Adjournment Debate last Thursday by Mr. J. Johnson. He called attention to the fact that Britain was extremely short of technologists and mentioned particularly the elevation of the Imperial College of Science to University status. This he said was merely nibbling at the huge problem of obtaining 3,000 or 4,000 more scientists or technologists in the future. In his reply to the debate, the Parliamentary Secretary to the Ministry of Education said the Ministry was endeavouring to encourage the development of what was called advanced technology in selected technical colleges and in selected courses at those colleges. The grant had been raised from 60% to 75%. Present hope was that colleges with courses attracting the maximum grant would develop more and more into institutions for technological work only. As regards grammar school teachers, he said the quantitative shortage was often exaggerated. It was not so much a case of their being insufficient teachers with scientific and mathematical qualifications, as that teachers were getting old and the better younger men were seeking other things to do.

Statement on T.V.

A general statement on television is to be made in the House in the near future, Mr. D. Gammans stated last week. He added this fact after saying he was unable to give the date on which work would begin to provide TV facilities for the Plymouth area.

T.V. Advisory Committee

The House was told last week that the report of the Television Advisory Committee had been received and would be made available as soon as possible after the Whitsun recess. This report includes recommendations of wavebands available for sponsored programmes, and its suggestions on technical matters considered will guide the Government on certain policy decisions.

Rural Electrification

The electrification of rural districts is the subject of one of three motions which have been successful in the ballot for notices of motions. Mr. Hurd has given notice that he intends on June 19, to call attention to the need for a more rapid extension of supplies of electricity to rural areas. He will move a resolution.

Tax on Gas Water Heaters

Gas water heater manufacturers consider reduction by one quarter in purchase tax, announced in the Budget, quite inadequate, Capt. Ryder told the Chancellor last week. He added that the heaters could, in fact, play an important part in fuel efficiency. He asked the Chancellor if he would bear in mind that it could be a diminishing return. Mr. Butler said he realised the factors involved, but there were difficulties in reducing purchase tax more than he did in the Budget. He declined to reply to the suggestion of some easement in the matter of hire purchase.

Suppressors on Motor Vehicles

It is now generally agreed that the voluntary scheme to get suppressors fitted to motor vehicles to reduce television interference had been a failure. Mr. Langford-Holt asked whether a regulation could be introduced requiring motorists to fit suppressors. Mr. Gammans, however, said he was reluctant to introduce compulsory measures as it would involve powers of inspection. He added that it was intended this summer to launch a widespread campaign to encourage motorists to fit suitable suppressors. Replying to a further question he agreed to examine the suggestion that motorists be asked to give a declaration in their application for a licence. A regulation making the fitting of suppressors compulsory on new models, comes into force on July 1.

Wavelength Adaptors

Mr. R. E. Winterbottom asked last week for information on the cost of introducing commercial television, including the use of adaptors for receivers. No reliable costs could be given, Mr. Gammans said, until the size of transmitting stations and range of frequencies to be covered by the adaptors had been settled.

Television in Aberdeen

The Assistant Postmaster-General was asked why Aberdeen did not have television when a booster station had been authorised for the Brighton area which already had facilities. He said that the booster station was being provided to give a reasonable service to persons who had already invested in sets. As to providing a station to serve Aberdeen, Mr. Gammans referred the questioner to the coming statement.

Central African Education

Report of the Commission on Higher Education for Africans in Central Africa would be published on May 22, the House was told earlier last week.

Trade Union Recognition

Mr. McLeavy last week sought information as to whether it had been decided to recognise certain Post Office unions which had previously claimed that status. He was told that a statement on the matter would be made soon after the House reassembled.

Electric Supply News . . .

Brierley Hill

The Urban District Council is to protest to the Midlands Electricity Board at the alleged delay in connecting up 72 new houses. At the recent council meeting it was stated that 20 houses on one estate were still empty and on another site 52 out of 98 houses completed were still waiting to be connected. It was said that the electricity delay prevented the council completing the record number of 300 houses last year.

Bristol

A fault in two grid lines and a fire in switchgear at Portishead generating station on Tuesday of last week caused a power cut throughout Bristol and in parts of North Somerset, Devon and Gloucestershire. The trouble started at about 12.30 p.m. when two grid lines between Portishead and Melksham and Exeter and Bridgwater went out of action. This caused overloading in the generating plant at Portishead and Feeder Road, Bristol, which was followed by a fire and extensive damage to the switchgear at Portishead. By taking emergency measures, alternative supplies were provided in some districts within 1½ hours and to most of the area within a few hours.

Cheltenham

Details of a proposed new 275 kV grid line, to run from the Midlands down to Melksham, were before the Cheltenham Rural District Council recently. It was then stated that the National Parks Committee had objected to the line's original route, which ran via Sudeley Castle, Winchcombe and Toddington Manor. The route had been amended and now ran via Postlip Paper mills, across the valley to Little Washbourne, and thence to the county boundary at Ashton-under-Hill. It had been suggested that instead of taking the line over the Cotswolds, it should be brought up the Severn valley. This would prove much more expensive and would involve technical difficulties, since the line would have to cross nine existing grid lines, it was stated.

Driffield

During recent levelling of the grass verge in Anderson Street by the Urban District Council, an 11 kV underground cable was fractured. The council has since been informed that their third party insurance does not cover them for such risks, and the Yorkshire Electricity Board has asked the council if it will accept liability for the cost of repair. When the matter was raised at the recent council meeting the Highways Committee chairman asked that comment should be deferred as negotiations were in progress with the Board. Nevertheless, one member declared that there should be a plan available showing where cables were laid. Another said he was against a minute which committed the council to paying for the repair of the cable and he proposed that the wording be amended to read "consider any claim in respect of the cost of repairing the cable." To this amendment the council agreed.

LIGHTING SCHEMES

Bournemouth.—T.C. is submitting to M.o.T. for approval, improved lighting schemes for Alum Chine, Holdenhurst, Knyveton, Wallisdown and Westcliff Roads and Talbot Avenue, at a total cost of £6,725.

Malvern.—The U.D.C. surveyor has prepared a report on street lighting. This seeks to convert from gas to electricity Pickersleigh Road from Worcester Road, Malvern Link, to the junction with Madresfield Road, during the present year; and to complete the programme during 1954-55 by extending the work to Barnards Green and part of Poolbrook Road.

Stoke-on-Trent.—Consent has been received to the borrowing of £13,452 for the provision of street lighting on a number of housing estates.

Walsall.—The remainder of Sutton Road is to have better lighting, the T.C. has agreed to spend £4,800 on electric lamps on 25 ft high columns. Electric lanterns are also to be placed on 95 existing columns in certain residential roads at an estimated cost of £3,525.

Company Activities . . .

Aberdare Cables (Holdings)

The substantial increase in profit of this concern for the year ended October 31 last was the result of increased works output arising from increased steel supplies and copper becoming freely available. The increased works output has since been maintained during the early months of the present financial year, states Mr. F. G. Penny, chairman and managing director, and when the uncertainty regarding the trend in copper prices is clarified, the company will maintain a well-filled order book for

Year to Oct. 31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	242,696	76,581	32	15	67/6	57/9
1949	359,503	141,151	52	20	68/4	49/9
1950	263,633	76,092	28	20	16/11	13/-
1951	279,706	93,086	36	20	15/3	12/7
1952	438,245	146,675	55	25	15/-	10/3

the home and export markets. Export orders have been adversely affected by the currency restrictions imposed in several of the Commonwealth countries, but quite recently the position has eased and licences for imports are coming through more freely, he adds. The associated company, South Wales Switchgear Ltd., has a steadily increasing order book and output at both Blackwood and Treforest factories. Mr. Perry also states that £250,000 has been transferred to general reserve, that account now standing at £400,000, and it is proposed in due course, subject to the consent of the C.I.C., to make a bonus issue of one new share for each existing share.

Ada (Halifax) Ltd.

This concern, which manufactures washing machines in addition to machine tools, is paying a dividend of 13¾% for the 11 months ended March 31 last, this being at the rate of 15% per annum, the same as last year. The consolidated trading profit, at £83,160, is just less than half that of the previous year.

Associated Electrical Industries

Ordinary shares of this company, numbering 2,205,000, held in America by the International General Electric, have been bought up by the city bankers, Morgan Grenfell and Co., who propose to offer them to existing A.E.I. shareholders in Britain in the proportion of just under one for every three held, it is stated. The price of these shares will be 75s. each.

Brush Electrical Engineering Co., Ltd.

Greater emphasis is now to be placed on this group's electrical products, which in the past have been subsidiary to diesel engine manufacture. This important change in policy was announced by Mr. Miles Beevor the managing director, at the annual general meeting last Thursday. He also announced that in future the Board would style the group as the Brush group instead of, as formerly, the Brush Aboe group. It was intended to change the name of the holding company to Brush Ltd., leaving the title Brush Electrical Engineering Co. for the use of the electrical side of the group's business. Sir Ronald Matthews, chairman of Brush Electrical Engineering Co., pointed out to shareholders that the association which had existed between the Brush and the Associated British Engineering groups had been ended by the death of Mr. A. P. Good, who had been the connecting link.

Enfield Cables Ltd.

The healthy improvement in the trading profit for 1952 was mainly due to the greatly increased turnover of the parent company and its overseas selling subsidiaries, according to Sir Philip Warter, the chairman. The turnover was the highest by far in the company's history and was made possible by the increased supplies of all raw materials, particularly copper, that became available in 1952, he states. Moreover, during

Year to Dec.31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	365,341	139,452	30	7½	39/-	31/-
1949	532,590	220,147	37	7½	36/9	26/6
1950	437,270	170,077	28	7½	32/7	28/-
1951	179,899	2,216	—	7½*	38/3	27/-
1952	596,389	161,921	19·3	5	28/-	16/3

* Final 3¾% on larger capital.

1952, the company obtained large export orders. On copper prices, he states that buyers are still holding off until they see what effect on prices of the freeing of the market on August 5 will be. At present trading conditions are extremely difficult, he adds. Since the beginning of the year there has been a substantial decline in the volume of orders from the B.E.A. and this may continue for some time yet, apparently, mainly on account of adjustments in stock levels by the Authority.

London Electric Wire Co. & Smiths Ltd.

A Coronation bonus of 5% in addition to the final dividend of 5% is being paid for 1952, making a total for the year of 15% (*12½%*). The group profit is £1,307,110, compared with £1,217,219 for the previous year.

John Thompson

The final Ordinary dividend is 12½%, making a total of 22½% (*same*) for 1952. The balance from the profit and loss account for the year is £332,469 (*£278,562*).

Dividends Declared

Cape Asbestos Co. Final of 20% making a total of 25% (*22½%*) Group profits £1,407,058 (*£1,381,659*).

Dewhurst and Partner. Interim of 4% (*same*).

Dictograph Telephones. Interim of 10% (*same*) but payable on increased capital.

International Combustion Africa. Interim of 10% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

May 29.—Liverpool. Electrical installation at Ashfield St. C.P. school. City Engineer and Surveyor, Municipal Bldgs.

May 29.—Maidstone T.C. Electrical installation in 66, 20, 12 and 20 houses on Shepway estate. Borough Surveyor, Palace Ave.

May 29.—Slough T.C. Supply and erection of electrically driven automatically controlled booster plant, capacity 120 g.p.m., for waterworks. E. Gardner Thorpe, Borough Engineer, Town Hall.

May 30.—Bristol. Supply of electrical measuring instruments to Engineering Dept., College of Technology. G. H. Sylvester, Chief Educ. Officer, Council House, College Green.

June 1.—Alton U.D.C. Supply of three sets of electrically driven vertical unchokeable sewage pumps with ancillary equipment for treatment works pumping station. John Taylor and Sons, Artillery House, Victoria St., Westminster. Deposit £5.

June 1.—Bushey (Herts) U.D.C. Supply 80 concrete columns and 140 W sodium lanterns, lamps and ancillary equipment for improved street lighting along five roads. Engineer and Surveyor, Council Offices. Deposit £2 2s. (See May 7 issue.)

June 1.—Herne Bay U.D.C. Installation of electricity in 51 houses on Sea St. estate. W. W. Smither, Engineer and Surveyor, Council Offices.

June 1.—Lisburn U.D.C. Electrical installation in 121 dwellings on Jubilee Ave. estate. Town Surveyor, Town Hall. Deposit £2.

June 1.—Southend-on-Sea T.C. Supply of two pedestrian-controlled electric street orderly trucks. Director of Public Cleansing, 41 High St. (See May 21 issue.)

June 1.—Wicklow (Eire). Electrical services at proposed new technical school. Consulting Engineer, L. C. G. Leonard, 12 Clare St., Dublin. Deposit £5 5s.

June 2.—Bristol. Supply of posts, beacons, flasher units, etc., for pedestrian crossings. City Engineer, Arno's Court, 470 Bath Rd., Brislington, Bristol 4. Deposit £2 2s.

June 3.—Grimsby T.C. Electrical installation in erection of Occupation Centre at Nunsthorpe. J. V. Oldfield, Borough Engineer and Surveyor, Municipal Offices, Town Hall Sq. Deposit £3.

June 3.—Dublin. Supply and erection of (*a*) three vertical spindle sewage pumps and electric motors capable of pumping 646 g.p.m., and (*b*) two storm water pumps and electric motors capable of 1,400 g.p.m. Required for N. Dublin drainage scheme (contract No. 8). City Treasurer, Exchange Buildings, Lord Edward St. Deposit £5 5s.

June 3.—Manchester. Alterations and additions to electrical installation at Newton Heath Technical College. City Architect, Town Hall. Deposit £1 1s. (See May 7 issue.)

June 4.—Cardiff R.D.C. Supply, erection and wiring of 58 concrete columns with supply and fixing of lamps for street lighting on Eglwys Wyn housing site, Whitchurch. Engineer and Surveyor, S. P. Youldon, Council Offices, 20 Park Place, Cardiff. Deposit £3 3s.

June 4. — Newbiggin U.D.C. Supply of nine 250 W M.V. lanterns, 48 80 W M.V. lanterns, and 13 60 W filament lanterns. H. S. Robson, Council Offices.

June 5.—Maidenhead T.C. Supply of lanterns and auxiliary gear, and also provision and erection of concrete columns, lanterns, gear and wiring, for mercury lighting in group A along Bath Rd. Borough Engineer and Surveyor, 14 Cranfurd Rise. Deposit £2.

June 5.—Oldham T.C. Supply of concrete lamp columns and electric lanterns in groups A and B. C. Worswick, Lighting Superintendent, Gas St. (See May 14 issue.)

June 6.—Billericay U.D.C. Provision and erection of 50 sodium discharge lamps on concrete columns along High Rd., Pitsea. Surveyor, Council Offices, High Street.

June 6. — Bredbury (Ches.) U.D.C. Supply and installation of 140 W sodium street lighting, including concrete columns, lanterns, lamps, control gear, etc., along 2¼ miles of A.560 trunk road. Engineer and Surveyor, Council Offices, George Lane. Deposit £2 2s.

June 6.—Ryton-on-Tyne U.D.C. Electric lighting and heating in 28 houses at Park Field North. Surveyor, Council Offices, Ryton Tower.

June 8.—Morley T.C. Supply and installation of sodium lighting along trunk road A.650. Street Lighting Superintendent, Town Hall. Deposit 10s. 6d. (See May 7 issue.)

June 8.—Ormskirk U.D.C. Supply and erection of 105 concrete columns, lanterns, 140W sodium lamps, switchgear and other equipment for Group A street lighting. Surveyor, Council Offices, Burscough St. (See May 14 issue.)

June 9.—Inverness. Supply of electric lamps during year ending June 30, 1954, for Craig Dunain Hospital. Secretary of Board of Management at the Hospital.

June 10. — Newcastle-under-Lyme T.C. Supply and installation of enclosed type lanterns, 150 W tungsten filament lamps, control gear and concrete columns for Group B lighting on estate roads. Borough Engineer and Surveyor, Lancaster Building, High St. Deposit £2 2s. (Advertised in this issue.)

June 12.—Aberdeen. Electrical work in erection of school at Ballater. G. Bennett Mitchell and Son, architects, 1 West Craibstone St., Bon Accord Sq.

June 19.—Belfast. Supply, erection, etc., of 110 kV and 33 kV main cables, auxiliary cables, etc., for Municipal power station to Donegall substation (N.1235), and 33 kV main cables and accessories for Stage 2 of 33 kV distribution system (N.1236). Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne Deposit £5 5s. (See May 7 issue).

June 19.—Londonderry. Electrical installation in Bellaghy School meals kitchen and dining hall. County Education Architect, Education Office, New Row, Coleraine. Deposit £1.

June 27.—Leven T.C. Installation of 140 W sodium discharge

street lighting along trunk road A.915 for about one mile. Burgh Surveyor, Carberry House.

June 30.—Ashbourne U.D.C. Supply and erection of 114 150 W tungsten lamps and standards for stage 2 of public lighting scheme. Engineer and Surveyor, King Edward St. Deposit £1 1s. (Advertised in this issue.)

No date stated.—Ayr. Supply of equipment and erection of 11 lighting units on trunk road A.77 at Monkton. Applications for (*a*) supply of lighting and electrical equipment, (*b*) supply of steel standards, and (*c*) erection work, to County Engineer, County Buildings.

No date stated.—Bristol. Tenders invited for refrigeration maintenance and supply of electric stores dating 1953-54 for Corsham and Frenchay Hospital Management Committee, Frenchay Hospital, Secretary is E. R. Clark.

No date stated.—Hastings T.C. Electrical installation in 53 dwellings on Gate Town estate and adjoining sites. Borough Engineer, 37 Wellington Sq. Deposit £2 2s.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horse Guards Avenue, S.W.1, quoting reference.*

June 16.—India. Supply of 406 2kVA auto transformers for Director-General, Store Dept., 32/44 Edgware Rd., London, W.2. Ref.: HN4836/52.

June 18.—South Africa. Supply of two 88 kV 1,000 MVA 3-phase a.c. 50 c/s outdoor type high voltage circuit-breakers for S. African Railways. Tender No. C.6264. Chairman of Tender Board, P.O. Box 7784, Johannesburg.

June 18.—South Africa. Tenders (No. S.O. 7549) issued by Union Tender and Supplies Board, Pretoria, for supply of seven centrifugal pumps with self-contained electric motors for 230 V single-phase. B.o.T. (Ref.: CRE 17178/53).*

June 23.—Tangier. Supply of electrical equipment for 5,500 V transformer station situated in rue de Méditerranée. Tangier Water and Electricity Board, 4 rue Vermeer. B.o.T. (Ref.: CRE 16591/53).*

June 25.—Uruguay. Supply of 4,550 distribution boxes without protection and 3,650 terminals for Administracion General, Usinas Electricas y Telefonos del Estado Montevideo. Tender No. 3859/53—Spec. No. 2186. B.o.T. (Ref.: CRE 17077/53).*

July 3.—India. Supply of considerable quantities of electric cable, total amount of about 75,650 yd. involved, for Director-General, Stores Dept., 32/44 Edgware Rd., London, W.2. Ref.: S.I.3578/52/1.

July 6.—New Zealand. Tenders (P. and T. 150/6140) invited for supply of large quantities of switchboard wire and cable to various specifications. Director-General, N.Z. Post Office Stores Div., Wellington.

July 15.—Australia. State Electricity Commission of Queensland requires manufacture, supply of 39 11 kV Auto Reclose outdoor pole mounting type oil circuit-breakers, under spec. no. 389. Secretary, Scottish Union House, Eagle St., Brisbane, B.o.T. (Ref.: CRE 17574/53).*

July 15.—New Zealand. Supply of one 1,000 MVA, 110 kV 600 A circuit breaker with control panel, protective gear and isolating switches for Halfway Bush substation. Contract No. 476. Town Clerk, P.O. Box 803, Dunedin. B.o.T. (Ref.: CRE 17168/53).*

July 15.—New Zealand. Electricity Dept. of Dunedin requires supply of a 3-phase set of lightning arresters for Halfway Bush substation. Contract No. 477. B.o.T. (Ref.: CRE 17167/53).*

Aug. 14.—Australia. Supply of 1,200 bracket type mounting and 300 suspension type mounting street lighting lanterns suitable for 100/200 W incandescent lamps. Former with asymmetrical refractors at 160% and latter with symmetrical refractors. Chief Engineer and Manager, Dept. of Electricity, Kelvin House, Adelaide St., Brisbane. Specifications at 10s. 6d. a copy.

Aug. 19.—Australia. Supply of materials, clearing of route, and erection of 132 kV overhead transmission line for State Electricity Commission of Queensland. Spec. T F./16 available from Agent-General for Queensland, 409-10 Strand, London W.C.2. (See May 7 issue.)

Sept. 15.—New Zealand. State Hydro-Electric Dept., Wellington, requires supply of four single-phase 110 kV current limiting reactors, each of 13,333 kVA through capacity, outdoor type, oil immersed and self-cooled. They are for Arapuni power station, Hamilton. Specifications available from N.Z. Govt. Office in London. Deposit £100 and bond £650.

Your Queries — Answered

Candle tubes with imitation drips, makers of? W.P.—Fitzgibbon and Murray, Ltd., Lower Mill, Kingston Road, Ewell, Surrey; Wheeler and Esser, 154 New Cavendish St., W.1; Ismay Lamps, Ltd., Roden Street Works, Ilford. (25882)

"Ultralux" lighting fittings, makers of? B.S.—Troughton and Young, Ltd., Imperial Court, Basil St., S.W.3. (22889)

Independent domestic ironers, makers of? W.M.—Rotary: Oprim Sales, Ltd., Albion Works, Parkway, Edgware, Middx., and De Renzi Holmes and Co., Ltd., Fox's Lane, Wolverhampton. Flat bed: Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, W.C.2. (22896)

"Macford" steam raiser, makers of? N.W.—Macfords, Ltd., 25/27 Demesne St., Wallasey, Cheshire. (22903)

"Multilite" torches, address for? W.W.—16b Whitgift St., Croydon. (22908)

"Junction" irons, makers of? T.E.—G. P. Chamberlain and Co., Ltd., Junction Works, Carmichael Road, South Norwood, S.E.25. (22919)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

HPD type cable and American type plugs which have been approved by the Underwriters Laboratory of New York, makers of? D.L. (22917)

CONTRACTS PLACED

Coventry. Electrical installation at Deedmore Rd. primary school, Hartley Electromotives Ltd., £1,996.

Middleton (Lancs) T.C. Supply and installation of electric fittings in 160 houses on Brookside estate. Marlow Electrical Co., £3,751.

Silsden (York) U.D.C. Conversion of street lighting between the Tannery and Aire Bridge, Yorkshire Electricity Board, £1,769.

Stoke-on-Trent. Improved street lighting in four roads, British Thomson-Houston Co. Ltd., £6,922.

Stockport T.C. Electrical installation at Offerton secondary school, Hallams (Electrical Contractors) Ltd., £5,507.

Swindon T.C. Electrical installation at Commonwealth secondary grammar school, Southern Electricity Board, £3,398.

Walsall T.C. Electrical repair work in houses for 12 months, Truman Electrical Co.

Wandsworth B.C. Supply of 51 sodium 140 W lamps with vacuum jackets for street lighting. Philips Electrical Ltd., £1,011.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Aerodyne. B715,499. Class 9. B715,500. Class 21. Electric suction cleaning machines. Hoover Ltd., Perivale, Greenford, Middx.

Alsheath. B713,434. Class 7. Presses (machines) and machine tools, all for use in the manufacture of coverings of electric cables. Loewy Eng. Co., Ltd., 376 Strand, W.C.2.

"Clipvac." 716,012. Class 8. Hair clippers. Wolseley Sheep Shearing Machine Co., Ltd., Wolseley Works, Electric Ave., Witton, Birmingham 6.

Comet in design. 714,579. Class 7. Aerators for aquariums. James North (London) Ltd., 316 Lee High Road, Lewisham, S.E.13.

Crysteel. 713,809. Class 11. Lighting fittings, parts and accessories. Benjamin Electric Ltd., Brantwood Works, Brantwood Road, N.17.

Litesold. 716,428. Class 9. Electrically-heated soldering irons. Light Soldering Developments Ltd., 30/32 Devonshire Road, Forest Hill, S.E.23.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	253 0 0	—
LEAD, good soft pig (foreign)	87-87½	104 0 0
TIN (99·99·76%) (Cash)	732½-735	—
,, (3 months)	730-732½	—
ALUMINIUM, commercial purity (del.)	161 0 0	—
ZINC	70½-70¾	88 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	50 10 0	—
Mild Steel Tape (0·04 in.)	40 0 0	—

TRADE NOTES

E.W.F. Messrs. F. V. Jones, 384 Kensington High St., W.14, have ceased to be a member of the Electrical Wholesalers' Federation, we are informed.

Change of Address. The Newcastle branch office of Elliott Bros. (London) Ltd., is being transferred, as from June 1, to larger and more modern premises at 36 Scottwood Rd., Newcastle-on-Tyne (Tel. Newcastle 23811). This new branch office is to be the area sales, service and instrument repair centre for Northumberland, Cumberland and Westmorland, Co. Durham and the Cleveland district of Yorkshire, including Middlesbrough. The company's process control interests are in the hands of Mr. E. F. Millican, while Mr. R. J. Rouse specialises in electrical measuring instruments.

New Branch. Hoover Ltd. have opened a district office at 35 King St., Wigan, for the company's sales-service organisation in Wigan and East Lancashire. The district manager is Mr. H. Shore. Hitherto, the Wigan office was accommodated as a "lodger" unit at the Liverpool branch office.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Joyce Engineering Ltd. Last day for receiving proofs in respect of intended dividends, June 5. Liquidator is J. M. M. Torquil, 4 Bucklersbury, London E.C.4.

Exchange Battery Service Ltd. June 5 is last day for receiving proofs in respect of intended dividends. Liquidator is L. H. Shipton, 31 Lloyd St., Manchester.

Renas Engineering Co., Ltd. Meetings of creditors and contributors will take place at Inveresk House, 346 Strand, W.C.2, on May 28 at 11.30 a.m. and 12 noon respectively.

Electroller Ltd. Meetings of members and creditors will be held at Lord, Foster and Co., 38 King William St., E.C.4, on June 20 at 12 noon and 12.15 p.m. respectively.

Bankruptcy

Herbert F. Thorrington, electrical contractor, of Eydon, Northants. Deficiency of £1,031 was mentioned at first meeting of creditors. Official Receiver said debtor's statement of affairs disclosed unsecured liabilities of £1,042. Assets, after preferential claims of £9 had been deducted, were expected to realise £11. No resolution was passed and matter was left in hands of Official Receiver as trustee of the estate.

Partnership Dissolved

Graham Brothers, electrical engineers and contractors of Zetland Place, Middlesbrough. Partnership between Thomas B. Graham and Cyril P. Graham dissolved as from April 5. Business will be continued by C. P. Graham, Harry J. A. Graham, and Charles P. Graham.

BANKRUPTCY ACTS

Intended Dividends

York. George H. Battye, trading as G. H. Battye, electrician at Clifton Rd., Pudsey. Last day for receiving proofs, June 10. Trustee is W. H. Meredith, Official Receiver, 29 East Parade, Leeds 1.

First Meeting

Boston. Peter A. Cockcroft, trading as radio and electrical engineer at Brook House, Penrhyn Ave., Rhos-on-Sea. Meeting at 22 Regent St., Park Row, Nottingham, on June 3 at 11.30 a.m., and public examination at Municipal Buildings, Boston, on July 23 at 11.30 a.m.

BUSINESS PROSPECTS

HOME

Aberystwyth R.D.C. Erection of 70 houses on Commins Coch site, 26 on Borth site and 8 on Llandre site. Council Offices, 18 Chalybeate Street.

Aldershot T.C. Tenders to be invited soon for erection of public library at estimated cost of £3,500.

Armagh. Loan of £79,000 granted for erection of primary and infant schools at Newtownhamilton.

Bexley (Kent) T.C. Tenders may soon be invited for first stage in erection of community centre at Falconwood. Also scheme approved for building of a secondary school.

Birmingham T.C. Construction of 117 dwellings on Wychall Farm estate, 6 three-storey flats at Stirchley, 7 two-storey houses at Sheldon and 4 two-storey flats at King's Norton. H. J. Manzoni, Engineer and Surveyor, Civic Centre.

Bolton T.C. Erection of 20 bungalows on Green Lane estate and 12 houses on Long Lane estate. Housing Director, Town Hall.

Boreham Wood (Herts). L.C.C. approval sought for erection of shop and maisonettes. Estimated cost, £30,000.

Bradford. First phase of new comprehensive secondary to be built at Budershaw is estimated to cost £247,500. Tenders will probably be invited shortly.

Brentford. Macleans, Ltd., Gt. West Rd., are planning extension to their factory to cost about £50,000.

Bridlington T.C. Erection of 82 dwellings on West Hill estate. Bills of Quantities from S. Briggs, Town Clerk, Town Hall.

Chesterfield R.D.C. John Adlington Ltd. are to develop Lydgate estate by erection of 350 houses. Also, 64 houses and 6 bungalows to be built on Allpits Farm estate.

Cork (Eire). Erection of School of Music and Broadcasting Studios. E. P. O'Flynn, architect, 60 South Mall.

Coventry. Application to be made to borrow £244,734 for three blocks of 11-storey flats in Tile Hill Neighbourhood Unit; and other sums for 54 flats on Hall's Farm estate and 18 on Bell Green Neighbourhood Unit.

Deptford B.C. Erection of block of 30 flats in Idonia St. Council's Architects, H. V. Ashley and Winton Newman, 3 Verulam Buildings, Gray's Inn, W.C.1.

Doncaster T.C. Block of 18 flats to be built which will be provided with communal laundry with electric washing machine. Also construction of 12 shops, 18 flats, etc., in Beckett Rd. Borough Architect's Office, 15 South Parade.

Down. About 3,000 houses costing about £5m are to be built at Belvoir Park, Belfast, for Hillsbrough R.D.C.

Dumfriesshire. T. Martin and Son, 41 Bank St., Dumfries, are architects for factory in Park Place proposed by Northern Wholesale Dairies, Ltd., The Creamery, Lockerbie.

Durham T.C. Permission received to spend £2,879 on provision of electricity at Durham Johnston Grammar Technical school, and £2,780 for similar work at Spennymoor Grammar Technical School. Fittings, costing £150, to be provided for Shildon Timothy Hackworth Girls' School.

East Sussex. 1954-55 school-building programme includes £102,600 Cuckfield secondary school, £103,200 Hove secondary school, and £101,500 Bexhill R.C. school.

Eccles (Lancs) T.C. It is proposed to erect 102, 144 and 58 houses on part 1 of Brookhouse estate.

Ellesmere Port U.D.C. Erection of 145 houses on Glenwood Rd. estate. Engineer and Surveyor, Queen Street.

Halifax T.C. Erection of 66 houses at Mixenden and block of flats in Moor Lane. Geoffrey Holden, borough engineer, Crossley Street.

Hendon. Michael Barnett and Bampton, 329 High Holborn, W.C.1, are architects for erection of synagogue in Danescroft Ave., N.W.4.

Holywell (Flint) R.D.C. is to build 48 houses at Maes Lygan.

Humshaugh (Northum). Alterations proposed at Barrasford Sanatorium to provide dispensary laboratory and library.

Ilford. Included in this year's programme are Fairlop Rd. junior and infants' school, £143,120, and Beal grammar/technical school extension (first instalment), £158,400.

Liverpool T.C. Erection of police station at Speke. City Architect, Blackburn Chambers, Dale St., Kingsway.

Luton T.C. Tenders to be invited for erection of blocks of (48) flats on Farley Hill and Runfold Ave. estates. Also the rural council is to build 100 houses at Houghton Regis.

Melton and Belvoir (Leics.) R.D.C. Plans approved for 60 houses and 4 blocks of flats on site of Central Ordnance Depot.

Middlesbrough. Shell-Mex and B.P. Ltd. expected to begin work shortly on large oil installation plant at Teesport.

Newbury R.D.C. Total of 40 houses to be built on seven sites as part of 1954 programme. Approval has been granted.

Northamptonshire. Health clinic costing about £12,000 to be built at Rushden.

Northern Ireland. Approval of Ministry of Commerce received by Short Bros. and Harland, Ltd., Airport Rd., for factory extensions at Castlereagh; by Doagh Flax Spinning Co., Ltd., Ballysillan Mill, for factory extensions; and by British Vacuum Cleaner & Engrg., Ltd. Lisnaharragh, Castlereagh Rd., for extension to factory. Tenders will be obtained by Ministry shortly for erection of factory on Rathcoole Industrial Estate.

Nottingham T.C. Erection of 52 houses and two-storey flats in Carlton Rd. and Windmill Lane. City Housing Architect, The Guildhall.

Oswestry (Salop) T.C. Approval given to plans for 80 houses on site near Middleton Rd.

Rickmansworth. Scheme in hand for erection of eight shops and flats.

Romford T.C. Layout plans prepared for 104 houses on Lodge Lane sites and 24 in Horndon Rd.

Rotherham T.C. Erection of proposed Kimberworth Park primary school. Applications to R. Bloomer, Director of Education, Education Offices.

Roxburgh. Plans approved for erection of primary school at Burnfoot at estimated cost of £225,000.

Woodbridge U.D.C. Erection of 30 houses in district. Surveyor's Office, 17 Thoroughfare.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Belford-Vaughan (Industries) Ltd., 69 Gloucester Place, W.1. Mechanical, electrical and general engineers, precision engineers, toolmakers, etc. Cap.: £100. Dir.: T. E. Coney.

Cooling Towers Ltd. To design and construct cooling tower installations for electrical or other power. Cap.: £100. Dirs.: to be appointed by subs. Subs.: K. J. Yelland, 20 The Mile End, E.17; and Mrs. G. A. Martin, 14 Leinster Rd., Cranley Gdns., N.10.

Cripps and Wood Ltd., The Square, Stow-on-the-Wold, Glos. Electrical engineers and contractors, manufacturers of and dealers in wireless apparatus, etc. Cap.: £150. Dirs.: J. Cripps and R. H. Wood.

Electro-Power Service Co. (Forest Gate) Ltd., 61 Odessa Rd., Forest Gate, E.7. Electrical engineers and contractors, etc. Cap.: £3,000. Dirs.: J. M. Williams, C. Ruggles and E. T. Bennett.

Etherington and Co. (Newhaven) Ltd., 5 Meeching Ave., Newhaven, Sussex. Electrical engineers, electrical wiring and installation contractors, dealers in electrical apparatus, etc. Cap.: £1,150. Dirs.: J. H. Etherington and E. W. Jackson.

Seddon and Bramhall Ltd., 30 Bank St., Sheffield. Electricians, electrical, mechanical, wireless, civil and constructional engineers, etc. Cap.: £500. Dirs.: A. Seddon, L. Bramhall, R. Bramhall and H. Bramhall.

Wessex Unit Holdings, Ltd., 20-21 Orchard St., Bristol 1. To acquire whole or part of issued share capital of Tubes and Fittings (Bristol), Ltd., T. & F. Pipework and Engineering, Ltd., T. D. L. Electrical Distributors, Ltd., Pee Cee Engineering Supplies, Ltd., and E. C. M. Engineering Designs, Ltd.; engineering in all its branches, etc. Cap.: £100. Dirs.: not named. Subs.: A. E. Nichols, 51 Broad St., Bristol 1, and N. G. Rascombe, 20-21 Orchard St., Bristol 1.

Weyco (Electrical) Ltd., Bevois House, 27/30 Basinghall St., E.C.2. Electrical engineers and contractors, etc. Cap.: £100. Dirs.: L. Hobson and A. E. Dyall.

Woodrow Transformers Ltd., 45 Bloomsbury Sq., W.C.1. Manufacturers of and dealers in electrical transformers, chokes, relays, coils, etc. Cap.: £1,000. Dirs.: E. J. Woodrow and Mrs. M. E. Woodrow.

MEETINGS TO NOTE

MONDAY, JUNE 8

BRIT. ELECTRICAL POWER CONVENTION and Exhibition opens at Torquay, continuing until Friday.

TUESDAY, JUNE 9

INCORP. PLANT ENGRS. (Manchester).—"Combustion Heat and Power," C. F. Roberts. Engrs.' Club, Albert Sq., 7.15 p.m.

INCORP. PLANT ENGRS. (London).—"Thermal Insulation of Plant and Buildings," C. G. Bower. Royal Soc. of Arts, W.C.2, 7 p.m.

EXHIBITION DIARY

Royal Ulster Agricultural Show. Opened at Balmoral Showgrounds, Belfast, on May 27 and closes on May 30.

Bath and West Agric. Show to be held between June 3 and 6.

British Plastics. Opens at Olympia on June 3, continuing until June 13.

BRUSH ELECTRICAL ENGINEERING CO.

Substantial Volume of Orders In Hand

THE 64th annual general meeting of The Brush Electrical Engineering Co., Ltd., was held on May 21, in London.

Sir Ronald W. Matthews, D.L., M.INST.T. (the chairman), presided.

The following is an extract from his circulated statement :—

It will be apparent to you from the directors' report and the accounts that 1952 has been a difficult year in certain directions. All branches of our business, however, have not been affected to an equal extent.

It is in regard to Associated Tube Wells Ltd., that we have had our most serious problems. Although the newest development, the operations carried out by this company provide an important market for the products of our electrical and engine factories and should in due course yield a substantial profit from the civil engineering operations themselves. Unfortunately, our first contracts have not proved entirely satisfactory, largely because the prices agreed in 1950 proved inadequate in the face of rising costs.

Sales

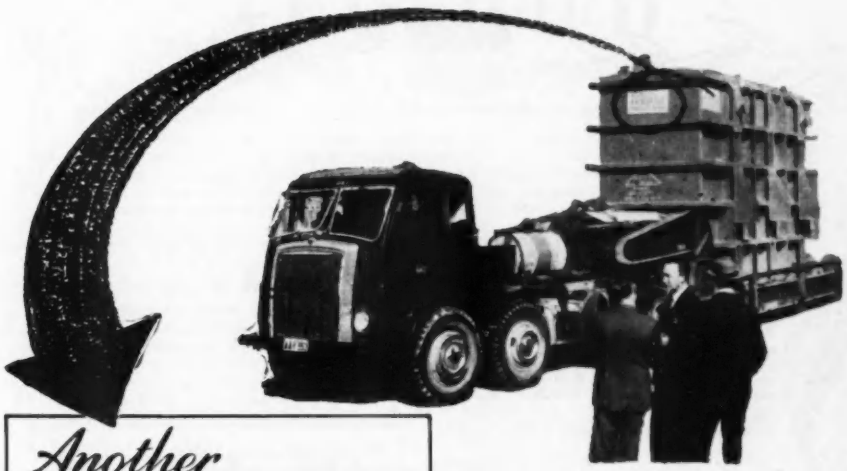
We are not yet out of the wood, but as a result of the determined steps taken by the management during 1952, the closing months of that year were more successful and more profitable than the spring and summer.

Having dealt at length with the widespread manufacturing activities, the statement referred to the recession in the export trade experienced during the middle of the year, and continued : Some of our more important markets, including India, Malaya, Australia and Brazil, drastically curtailed their orders and although strenuous efforts were made to sell elsewhere, the setback was serious for some months and we have not yet fully recovered the ground lost. Notwithstanding the drop in order intake during 1952, the group as a whole still has a substantial volume of orders in hand and a number of encouraging orders both from home and abroad have been received.

The importance to the national economy of exports of capital equipment is well known; unless the heavily industrialised countries export their products to the primary producing countries there can be no hope of raising and equalising the standard of life throughout the world. The Brush Aboe group is exporting capital goods which have a life of many years and our customers would like to pay for them over a number of years. This is one of the services they are getting from our competitors in other countries, but we cannot pay our suppliers and our work people over a number of years; they want the food and clothing they have earned now. I feel most strongly that this question of extended credits can only be solved with Government assistance.

The future development of the group continues to receive very close attention to ensure that the programme is based upon the most modern scientific knowledge and is in harmony with the world economic trends.

The report was adopted.

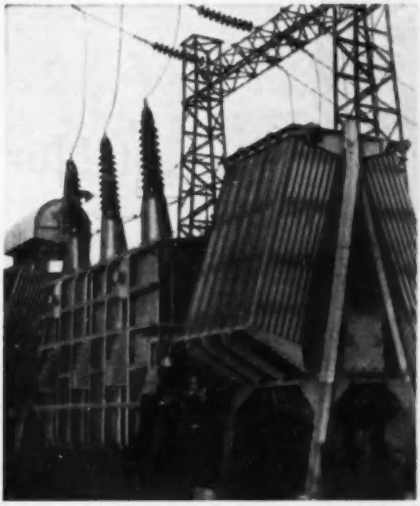


Another HACKBRIDGE TRANSFORMER

FOR SERVICE OVERSEAS

MONTH after month large Hackbridge transformers leave the Works for destinations extending to the most distant parts of the world. The illustrations show the arrival and installation of one of five 30,000 kVA 132/33 kV type ON/OB Hackbridge transformers for the Electricity Commission of New South Wales.

Over 18 million kVA of Hackbridge transformers have been manufactured, including some of the world's largest units.



HACKBRIDGE
TRANSFORMERS

Made in Britain by

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
Telephone : Walton-on-Thames 760 (8 lines) *Telegrams : "Electric, Walton-on-Thames"*

Loyal Greetings to

Her Majesty

Queen Elizabeth

from the

22,000

of Her subjects

employed by—

METROPOLITAN-VICKERS ELECTRICAL COMPANY LTD.

TRAFFORD PARK · MANCHESTER 17

Member of the A.E.I. group of companies

A/A 302

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

JUNE 4 ISSUE

The latest date on which Classified Advertisements can be accepted for our issue of June 4, will be mid-day on FRIDAY, MAY 29

TENDERS INVITED

BOROUGH OF NEWCASTLE-UNDER-LYME

PROVISION OF STREET LIGHTING INSTALLATIONS

TENDERS are invited for the supply and installation of lanterns, lamps, control gear and concrete standards for Group "B" lighting on various estate roads in the borough of Newcastle-under-Lyme.

Tungsten filament lamps (150-W) in enclosed-type lanterns are specified with mounting height of 15 ft.

Contract documents may be obtained from, and drawings inspected, at the office of the Borough Engineer and Surveyor, Lancaster Building, High Street, Newcastle, Staffs, on payment of a deposit of £2. This sum will be returned on receipt of a bona-fide tender and return of all contract documents.

The successful contractor will be required to conform to the Standing Orders of the Council relating to contracts.

Tenders are to be delivered to me not later than 10 a.m. on Wednesday, June 10, 1953.

No tender shall be received except in a plain sealed envelope which shall bear the words "Tender for Group 'B' Lighting Installations," but shall not bear any mark or name indicating the sender.

The lowest or any tender will not necessarily be accepted.

C. J. MORTON,
Town Clerk.

District Bank House,
Penkhull Street,
Newcastle, Staffs. (D 744)

ASHBOURNE URBAN DISTRICT COUNCIL

PUBLIC LIGHTING SCHEME—STAGE 2

THE COUNCIL invite Tenders from experienced firms for the supply and erection of the following approximate number of street lamps:—

No. 114 150 W tungsten lamps complete with standards.

Plan, general conditions of contract, specification and requirements of the contract may be obtained from the office of the Engineer and Surveyor, King Edward Street, Ashbourne, Derbyshire, upon receipt of a deposit of £1 1s. which will be returned on receipt of a bona-fide tender not subsequently withdrawn.

Tenders with all documents should be enclosed in plain sealed envelopes endorsed "Tender for Street Lighting: Stage 2" and should reach the office of the undersigned not later than Tuesday, June 30, 1953.

The Council do not bind themselves to accept the lowest or any tender.

F. HUGH THOMAS,
Clerk to the Council.

Compton Offices,
Ashbourne, Derbyshire. (D 779)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the post of:—

SHIFT CHARGE ENGINEER
Letchworth No. 2 Generating Station

Salary, Class "D," Grade 7, £633-£643 per annum.

Applicants should preferably have served an apprenticeship and have reached the standard of Ordinary National Certificate in electrical and/or mechanical engineering, and possess experience in the operation of generating stations.

Applications should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by June 6, 1953.

W. N. C. CLINCH,
Controller.
(D 764)

CROWN AGENTS FOR THE COLONIES

SENIOR SUPERVISOR (ELECTRICAL) required for the Uganda Public Works Department for one tour of 30-36 months with prospect of renewal of contract. Salary, etc., according to age and experience in scale £819 rising to £1,170 a year. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates between 25 and 45 years must have served an electrical engineering apprenticeship and have had wide experience in electrical installation of domestic premises and public buildings. A knowledge of installation, repair and maintenance of industrial equipment and machinery, erection and maintenance of overhead lines up to 11 kV, and experience in keeping costs and labour allocation will be an advantage. A. C. and G. Certificate (Electrical Installation) is desirable.

Apply in writing to the Crown Agents, 4 Millbank, London, S.W.1, stating age, name in block letters, full qualifications and experience and quoting M2C/29635/EE. (D 749)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 39/53

APPLICATIONS invited for following superannuable N.J.B. appointments:—

1. STATION SHIFT CONTROL ENGINEER, Tir John Power Station, Swansea. H.10 (£641 to £667 p.a.).

H.N.C. and experience in control room of modern power station required.

2. SENIOR DRAUGHTSMAN, Generation (Construction) Department, Div. H.Q. D.5 (£567 - £671 p.a.).

H.N.C. and experience of design and layout of turbo-alternators, boiler plant, etc., steam and feed pipework; conveying and coal handling systems, etc.

Application forms obtainable from Div. Secretary, British Electricity Authority, South Wales Division, Twyn-y-Fedwen Road, Gabalfa, Cardiff, should be returned by June 6, 1953. (D 758)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 118/53. SHIFT CHARGE ENGINEER at Barrow Generating Station. Salary £633/£643 (D.7).

Vacancy No. 119/53. ASSISTANT SHIFT CHARGE ENGINEER at Huncoat Generating Station, near Accrington. Salary £607/£629 (F.9).

Vacancy No. 120/53. ASSISTANT SHIFT CHARGE ENGINEER at Ribble Generating Station, Preston. Salary £680/£706 (H.9).

Vacancy No. 121/53. ASSISTANT SHIFT CHARGE ENGINEER at Barton Generating Station, Manchester. Salary £680/£706 (H.9).

Separate applications to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before June 10. (D 760)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 3 (Sheffield) Sub-Area

SENIOR ASSISTANT ENGINEER—OPERATION

Applicants should be Corporate Members of the Institution of Electrical Engineers or have equivalent qualifications, and should have had responsible experience in the operational control of 66 kV, 33 kV, 11 kV and medium-voltage systems supplying large industrial, residential and rural areas.

The successful candidate will be responsible for the operation of the Sub-Area transmission and distribution system, including all switching operations under normal and emergency conditions, feeder and transformer loadings, switching programmes for maintenance and construction work, and preparation of fault reports. He may be required to take charge of one or more control rooms.

Salary, N.J.B., Class "N," Grade 4, £1,300-£1,341 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than June 11, 1953.

No. 6 (Hull) Sub-Area

Bridlington District

THIRD ASSISTANT DISTRICT ENGINEER
Driffield

Applicants should have had experience in planning, estimating and construction of overhead lines and substations, and in the operation of an extensive system in a rural area.

Candidates should possess the Higher National Certificate or equivalent qualifications.

The successful candidate will be required to reside in Driffield and undertake standby duty.

Salary, N.J.B., Class "D," Grade 9, £561-£578 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than June 11, 1953. (D 768)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 3 Sub-Area

SENIOR ASSISTANT ENGINEER (Technical) required at Chester. Salary £964 to £1,005 per annum (N.J.B. Class "H," Grade 4).

Applicants must be chartered electrical engineers and have experience in modern protective systems and metering practice including the testing and commissioning of switchgear transformers and associated equipment, preferably up to 33 kV and in meter testing and repairs.

Application forms obtainable by written request from the Manager, No. 3 Sub-Area, Electricity House, Newgate Street, Chester.

No. 4/5 Sub-Area

ASSISTANT SECTION ENGINEER, Conway District based on Llandudno. Salary £578 to £600 per annum (N.J.B. Class "E," Grade 9).

Applicants should have had a thorough training and practical experience in the operation and maintenance of e.h.v., h.v. and l.v. overhead and underground distribution networks, and possess the technical qualifications necessary to enable them to become chartered electrical engineers.

Standard application forms obtainable from the Manager, No. 4/5 Sub-Area, Electricity House, Rhostyllen, near Wrexham.

The appointments are superannuable and subject to medical examination.

Closing date, June 8, 1953. (D 746)

GOVERNMENT OF IRAQ

ASSISTANT ELECTRICAL ENGINEER required for the Basrah Port Directorate, for one year in first instance. Salary in scale I.D. 60, rising to I.D. 80 a month (I.D. 1=£1), plus C.O.L.A. between I.D. 10 and I.D. 14 a month, according to dependents. Provident fund. Free passages. Liberal leave on full salary. Candidates must have served an apprenticeship with a recognised firm of electrical engineers and have had good practical experience in the maintenance and repair of electrical motors and machinery (a.c. and d.c.), house wiring, instrument repair, switchgear maintenance, cable jointing, etc. They should possess a technical qualification of at least Ordinary National Certificate standard.

Apply in writing to the Crown Agents, 4 Millbank, London S.W.1, stating age, name in block letters, full qualifications and experience, and quoting M2C/29182/EE. (D 761)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following posts:—

JUNIOR ENGINEER
Cliff Quay Generating Station

Salary, Class "K," Grade 19, £390, to Grade 15, £545 per annum.

JUNIOR ENGINEER
Little Barford Generating Station

Salary, Class "G," Grade 16, £390, to Grade 14, £491 per annum.

JUNIOR ENGINEER
Peterborough Generating Station

Salary, Class "F," Grade 15, £390, to Grade 14, £466 per annum.

Commencing salaries depending on qualifications and experience.

The duties of the successful applicants will include assisting in the Control Room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in electrical engineering or its equivalent.

Applications, stating age, qualifications and experience, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by June 13, 1953.

W. N. C. CLINCH,
Controller.
(D 765)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

COMMERCIAL ASSISTANT (male) required in the Conway district of No. 4/5 Sub-Area, based on Llandudno. Salary N.J.B., Class "E," Grade 8 (£619-£629 p.a.).

The person appointed will be directly responsible to the District Commercial Officer, and the duties attached to the post will include the general organisation of the Service Centre, dealing with applications for supply (rural and urban), the preparation of estimates for installation work, including the supervision of contracting staff, and where necessary enquiries on changeover schemes. The successful candidate will be given the option of the service tenancy of a self-contained flat above the Service Centre.

The appointment is superannuable and subject to medical examination.

Standard application forms obtainable from the Manager, No. 4/5 Sub-Area, Electricity House, Rhostyllen, Wrexham. Quote Ref. 146A. Closing date, June 6, 1953. (D 745)

BOROUGH OF BARKING

Borough Engineer and Surveyor's Department

APPLICATIONS are invited for the post of SECOND ENGINEERING ASSISTANT (Mechanical and Electrical), Grade A.P.T. III/IV, at a salary of £525-£600 per annum, plus appropriate London weighting.

Candidates should have served an apprenticeship with a reputable firm and should hold the National Certificate or equivalent qualification in electrical engineering. Some experience in the layout and maintenance of heating and electrical installations in public buildings is essential.

Application forms, to be obtained from the Borough Engineer, Town Hall, Barking, should be returned to the undersigned not later than Friday, June 12, 1953.

E. R. FARR,
Town Clerk.

Town Hall, Barking. (D 782)

SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER (MAINTENANCE)

MELKSHAM District of No. 2 (Newbury) Sub-Area. Salary, N.J.B., Class "F," Grade 9 (£607-£629 per annum). N.J.B. conditions of service.

The duties of the post will be to assist the Operation and Maintenance Engineer, principally with the operation and maintenance of the H.V. and L.V. overhead and underground distribution systems working at voltages up to 33,000, and to undertake minor mains construction work. Standby duties are involved. The qualifications required are an approved technical training and experience of similar work, including fault-location.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Road, Newbury, Berks, and returned to him, in envelopes suitably endorsed, not later than June 8, 1953. (D 759)

EASTERN ELECTRICITY BOARD

Northmet Sub-Area

ENGINEERING DRAUGHTSMAN

Sub-Area Headquarters. (Ref. No. 391)

APPLICATIONS are invited for the appointment of Engineering Draughtsman in the Civil Engineering and Buildings Drawing Office, Southgate, London, N.14.

Candidates should have had the requisite training and experience to be able to prepare plans and detailed drawings of buildings and civil engineering works for substations, service centres, workshops and offices.

The salary will be in accordance with Grade 6, Schedule "D", of the National Joint Board Salary Agreement within a range of £458-£565 p.a., inclusive of London Allowance. Future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, by letter, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to the Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London N.14, within fourteen days of the appearance of this advertisement. (D 781)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following position:

THIRD ASSISTANT ENGINEER (TESTING) S/13.375

Divisional Headquarters, Portsmouth

Applicants should possess a thorough knowledge of thermo-dynamics and be experienced in the determination of efficiency and losses occurring in large turbines and condensing plant. A sound knowledge of boiler testing is also required and applicants should be well acquainted with instruments employed in this work.

Plant operating experience will be an advantage. Preference will be given to those possessing qualifications admitting to corporate membership of a senior professional institution.

Salary, N.J.B., AX/CX 5, £649-£835.

Special application forms obtainable from P. D. A. Oliver, Divisional Secretary, British Electricity House, High Street, Portsmouth, must be returned by June 15, 1953. (D 775)

NORTHAMPTON POLYTECHNIC, LONDON, E.C.1

APPLICATIONS are invited for the following appointments in the Department of Electrical Engineering:

(a) SENIOR LECTURER IN ELECTRICAL POWER with particular reference to machines. Applicants will be required to teach these subjects to Part II Final Degree students. Salary £1,076 by £25 to £1,238.

(b) LECTURER GRADE B. Applicants will be required to teach electrical engineering subjects to National Certificate and Part I Degree students. Salary £490 by £25 to £765 with allowance of £60 for graduates or equivalent and up to £54 for training, plus London Allowance of £36 (£48 if over 37) with increments of £18 for each year of approved industrial experience or period spent in H.M. Forces, making a maximum salary of £927.

Candidates for both posts should possess a degree in electrical engineering or equivalent qualification and have had practical experience in the electrical industry.

Further particulars and form of application from the Secretary.

J. E. RICHARDSON, Ph.D., B.Eng., M.I.E.E., Principal. (D 747)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 40/53.

APPLICATIONS invited for superannuable N.J.B. appointment of DEPUTY POWER STATION SUPERINTENDENT, Carmarthen Bay Power Station, Burry Port. Salary: "K.3" (£1,182 to £1,233 p.a.).

Applicants should preferably be Corporate Members of the Institution of Mechanical and/or Electrical Engineers and must have had wide experience in the operation, maintenance and administration of a modern generating station.

Application forms obtainable from Div. Secretary, British Electricity Authority, South Wales Division, Twyn-y-Fedwen Road, Gabalfa, Cardiff, should be returned by June 12, 1953.

May 21, 1953. (D 780)

CITY OF SALISBURY

Southern Rhodesia

VACANCY FOR ELECTRICAL ENGINEER, GRADE 2

APPLICATIONS are invited for the post of Electrical Engineer, Grade 2, on the salary scale £880 by £60 to £1,280.

Candidates should possess a degree in electrical engineering or the equivalent, and/or be corporate members of the British Institution of Electrical Engineers, and have had at least three years' experience with a supply undertaking in the laying, jointing of mains, erection of overhead lines and substations up to 33,000 V, and be capable of designing, controlling and maintaining a distribution network.

The appointment will be subject to the Council's Service and Leave Regulations, which will be made available for inspection at the offices of the undersigned. The salary payable will commence at the minimum of the above scale, and rise by annual increments to the maximum; no cost of living or other allowances are payable.

The successful candidate must be able to comply with the regulations of the Southern Rhodesia Immigration Authorities, and will be required to submit a satisfactory medical certificate of fitness.

Applicants are requested to submit full particulars of their qualifications, training and experience, giving details of positions held and salaries received, marital state, age, place of birth, and nationality. Copies of no more than three recent testimonials may be included.

Canvassing, directly or indirectly, will be a disqualification.

Applications, suitably endorsed on the cover, must reach the offices of the undersigned on or before Saturday, June 20, 1953. Airmail paper should be used.

DAVIS & SOFER LTD.,
Agents to the City Council of Salisbury.
52 and 54 St. Mary Axe,
London E.C.3.
May 20, 1953. (D 769)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London allowance, and conditions of service in accordance with N.J.B. Agreement, Schedule "A." Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

STATION CHEMIST

West Ham Generating Station

Candidates should have thorough knowledge of power station practice relating to the examination of fuels, oils and waters. Organising ability and leadership qualities also required. Candidates should preferably have held similar post in modern station. Laboratory also responsible for chemical services to Bow Generating Station. Salary, Class "J," Grade 7, £857/17/- p.a.

SHIFT CHARGE ENGINEER

Lombard Road Generating Station

Experience in efficient operation of turbo-alternators and boiler plant essential. Character and ability to deal with staff problems important. Salary, Class "F," Grade 7, £731/17/- p.a.

SHIFT CHARGE ENGINEER

Barnes Generating Station

Qualifications: electrical and mechanical training with practical experience of the operation and maintenance of turbines, boilers and rotary convertors. Salary, Class "C," Grade 7, £628/19/- p.a.

JUNIOR ENGINEER

Hackney Generating Station

Generating station experience an advantage. Good opportunity for gaining further experience. Salary, Class "F," Grade 14, £476 p.a.

Application may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, W.1, and be received within 14 days of this advertisement. (D 762)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following position:

THIRD ASSISTANT ENGINEER (ELECTRICAL) S/13.412

Construction Department

Applicants should be in possession of technical qualifications admitting to corporate membership of a recognised professional institution, preferably have had experience in a manufacturer's works, and possess some knowledge of the layout of large switchgear or cabling installations.

Salary, N.J.B. AX/CX 5, £649-£835.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, British Electricity House, High Street, Portsmouth, must be returned by June 15, 1953. (D 776)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department
Vacancy No. 22/53

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction, drainage and sanitation schemes, associated with offices and administrative buildings.

The salary will be in accordance with Grade 5 (£567-£671 per annum) or Grade 6 (£433-£567 per annum) of Schedule "D" of the National Joint Board Agreement.

DRAUGHTSMAN
Transmission Department, Divisional Headquarters, Nottingham
Vacancy No. 42/53

Candidates should preferably have had experience in one or more of the following: design and construction of high-voltage substations or overhead transmission lines and underground cable systems. Civil engineering, electrical engineering, including layouts and diagrams for H.V. transformers and switchgear.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Grade 6 of Schedule "D" (£433-£567 per annum), according to qualifications and experience.

ENGINEERING DRAUGHTSMEN (MECHANICAL)
Construction Department
Vacancy No. 44/53

Senior draughtsmen are required in the mechanical section of the Construction Department. Candidates should have experience in one or more of the following:—

(i) Design and layout of power-station equipment, including turbo-alternators, boiler plant, coal and ash plant, and general station auxiliaries.

(ii) H.P. and L.P. steam and feed pipework. Condensing plant and feed heating systems.

(iii) Conveyor plant, coal-handling systems and material handling of station auxiliary equipment.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Grade 5 (£567-£671 per annum) and Grade 6 (£433-£567 per annum) of Schedule "D," according to experience.

JUNIOR ENGINEER
Hinckley Power Station
Vacancy No. 58/53

Candidates should have gained an Ordinary Certificate in electrical engineering and have had experience in a power station.

The salary will be in accordance with Schedule "A," Class "B," Grade 13 (£390 per annum), progressing to Class "B," Grade 12 (£404-£423 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be June 4, 1953.

SHIFT CONTROL ENGINEER
Lincoln Power Station
Vacancy 59/53

Applicants should have had a sound training and practical experience in a modern power station. The possession of a Higher National Certificate in electrical engineering, or its equivalent, would be advantageous.

The salary will be in accordance with Schedule "A," Class "F," Grade 10 (£577-£598 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be June 4, 1953.

ENGINEERING DRAUGHTSMEN (ELECTRICAL)
Construction Department
Vacancy No. 61/53

Candidates should have experience in the preparation of layouts and diagrams for the installation of E.H.T. and L.T. switchgear, transformers, E.H.T. and L.T. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with Grade 5 (£567-£671 per annum) or Grade 6 (£433-£567 per annum) of Schedule "D" of the National Joint Board Agreement.

The closing date for this appointment will be June 8, 1953.

The above appointments will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the dates stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(D 763)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, an ASSISTANT in the Commercial Department of District 223 (Swansea) in the West Central Sub-Area.

Salary in accordance with Class "F", Grade 9 (£607 £618 £629) of N.J.B. Schedule.

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary, to arrive by June 13, 1953.

Previous applicants need not re-apply.

D. G. DODDS,
Secretary.
St. Mellons, Cardiff. (D 783)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER is required at Ironbridge Power Station, Salop. N.J.B. service conditions, superannuable appointment. Salary within Schedule "A," Grade H.9, commencing at £680 per annum.

Higher National Certificate in electrical and/or mechanical engineering required, together with some experience in the operation and maintenance of boilers and turbines, and E.H.T. switchgear.

Application forms available from the Establishments Officer, 53 Wake Green Road, Birmingham 13, to be returned by June 13, 1953. (D 767)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ENGINEERING DRAUGHTSMAN required in the Transmission Department, Divisional Headquarters, Bristol.

Superannuation scheme. Salary N.J.B. Schedule "D", Grade 6, £433 to £567.

Some experience in preparation of diagrams for switchgear and/or communications equipment required.

Applications to be made on Forms AE6/ACT obtainable from the Divisional Secretary, 26 Oakfield Road, Bristol 8, to be returned by June 8, 1953. (D 748)

NORTH WESTERN ELECTRICITY BOARD

Appointment of
METER TESTERS AND METER REPAIRERS (MECHANICIANS)
Testing Station, Preston

RATE of pay, 42·5d. per hour (£7/15/10 for a 44-hour 5-day week). N.J.I.C. conditions.

Applications, stating age, training and experience, to the Manager, No. 4 Sub-Area, The North Western Electricity Board, 40-41 Lune Street, Preston, by June 5, 1953. (D 766)

BRITISH ELECTRICITY AUTHORITY (South West Scotland Division) require a GENERATION ENGINEER (OPERATION). Candidates should preferably be corporate members of one or more of the recognised engineering institutions and be familiar with the operation of modern H.P. plant. The salary will be within the provisional salary range £1,325 to £1,800 per annum.

Applications, stating age, present position and salary, and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, Winsley Street, London W.1, by June 15, 1953. Quote reference AE/383. (D 770)

BRITISH ELECTRICITY AUTHORITY, South East Scotland Division, require ASSISTANT MAINTENANCE ENGINEER (MECHANICAL) at Portobello Power Station. Salary £717 to £748 (N.J.B. Class "H.8") with pension scheme. Applicants should have wide experience in the operation and maintenance of a modern power station with water tube boilers. Good technical qualifications combined with sound practical training essential.

Applications by June 15, 1953, to Divisional Controller, British Electricity House, Portobello, Midlothian. (D 787)

BRITISH INSULATED CALLENDER'S CABLES LTD. require at their Leigh Works an ENGINEER/PHYSICIST or ELECTRICAL ENGINEER to specialise in cables for domestic and industrial wiring. Applicants should have a sound knowledge of installation practice and should be able to undertake development work in this field. The post offers considerable scope to the specialist possessing initiative and enterprise.—Applications should be submitted in writing to the Staff Officer, B.I.C.C., Ltd., Prescot, Lancs. (D 771)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

CENTRAL LONDON Drawing Office of English Electric has vacancies for MECHANICAL DRAUGHTSMEN to be engaged on high voltage switchgear. Good workshop and D.O. experience essential, as the positions carry responsibility for detail design for most efficient production. Excellent canteen facilities available.—Write, quoting Ref. 112L, to C.P.S. Dept., Marconi House, Strand, W.C.2. (D 707)

COPYWRITER required in the preparation of technical advertisements, descriptive literature and editorial articles for electrical equipment.—Applications, giving age, experience and salary required, should be addressed to the Advertising Manager, J. A. Crabtree and Co., Ltd., Lincoln Works, Walsall, Staffs. (D 750)

DRAUGHTSMEN required for low-tension small switch and fuse gear.—Write, giving age, details of experience and salary expected, to the Personnel Officer, W. T. Henley's Telegraph Works, Co., Ltd., Gravesend, Kent. (D 695)

ELECTRICAL ENGINEER, Grad I.E.E., required in Sales/Contracts office for wide range of rectifier equipments.—Write in confidence, giving age, experience and qualifications, to Personnel Manager, Standard Telephones and Cables Ltd., Warwick Road, Boreham Wood. Elstree 2401. (D 751)

ELECTRICAL ENGINEER required for large industrial concern under British management near Calcutta. Must be capable of taking charge of large substation and be able to supervise maintenance and repairs of mains and motors. Previous experience essential. Applicant should be under thirty and preferably unmarried. Excellent terms are offered. Reply with full details of qualifications and experience with references to Box No. 2673, Electrical Times. (D 752)

ELECTRICAL ENGINEERS, senior and junior, degree and O.N.C. respectively, required for development of rectifier equipments up to 20/30 kW. Experience of circuitry development essential.—Write in confidence, giving age, experience and qualifications to Personnel Manager, Standard Telephones and Cables, Ltd., Warwick Road, Boreham Wood. Elstree 2401. (D 753)

ELECTRICAL or MECHANICAL ENGINEER/SALESMAN required for the Far East. Should hold Higher National Certificate or engineering degree. Bachelor, not over 25. Salary according to experience, plus cost-of-living allowance; passage and furnished accommodation provided; provident fund; pension scheme.—Apply: Staff Secretary, The Borneo Co. Ltd., 143-149 Fenchurch Street, London E.C.3. (D 772)

EXPERIENCED ELECTRICIANS required for large Paper Mill by Bowater's Thames Paper Mills Ltd., at Northfleet, Gravesend, Kent. Must have sound experience of maintenance and installation of a.c. and d.c. motors, switchgear, distribution and power-house equipment. Good technical knowledge essential. (D 696)

LABORATORY ASSISTANTS for the development of instruments, meters and relays. University degree or Higher National Certificate standard required.—Apply in writing, stating age, experience and salary required, etc., marking envelopes "Meter Engineer," to Personnel Manager, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17. (D 383)

PHYSICIST, ELECTRICAL ENGINEER or CHEMIST required by large firm of cable makers and electrical engineers for responsible technical and development work on rubber and plastic cables of all types. Applicants should preferably have had previous experience with low-voltage power and lighting cables. This is a senior post offering considerable scope for a man with outstanding qualities.—Reply to Box No. 2677, Electrical Times. (D 773)

REPRESENTATIVE of outstanding ability required for London and Home Counties by a leading electrical engineering company. Applications will only be considered from experienced men with a connection in the lamp and electrical industry.—Write, with full details of age, experience, qualifications, and salary required, to Staff Manager, Siemens Electric Lamps and Supplies, Limited, 38/39 Upper Thames Street, London E.C.4. (D 785)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

GUIDED WEAPONS

ELECTRICAL Engineer, or Mathematician with relevant postgraduate experience, required for theoretical work on design of automatic control systems. Some knowledge of effect of noise on servo mechanisms an advantage. Senior staff appointment with good salary and prospects. Pension scheme.—Write in detail to:

Personnel Manager,
De Havilland Propellers Ltd., Hatfield, Herts.
(D 711p)

REPRESENTATIVE, age about 30, required by London electrical wholesalers in S.E. London district. Must be energetic and have connection with works and factories.—Write in confidence, giving full details of experience to General Manager, Box No. 2675, Electrical Times. (D 754)

REPRESENTATIVE required by firm of electric washboiler manufacturers for London area.—Write, giving full details of experience and qualifications, including age, etc., to Box No. 2659, Electrical Times. (D 686)

SALES MANAGER is required to cover the home and export sales of electrical motors and generators up to 100 h.p. Applicants should be trained electrical engineers and Corporate Members of the Institution of Electrical Engineers, with previous successful experience in a similar capacity. In particular, candidates must be well acquainted with the application of motors to industry.—Reply, giving full details, to Box No. 2679, Electrical Times. (D 786)

SALES OFFICE ASSISTANT with experience in dealing with inquiries for small insulated wires and cables from the manufacturing industry.—Write full details exp. and salary required, Box No. 2669, Electrical Times. (D 723)

SENIOR DRAUGHTSMAN required for work on electrical power resistances and large electrical heaters for industrial applications. Previous experience on this class of work desirable, but not essential.—Apply by letter with full details, including age, technical qualifications, whether married or single, and salary required, to The Expanded Metal Co., Ltd., Stranton Works, West Hartlepool. (D 656)

SENIOR DRAUGHTSMEN, Mechanical, required for Cable Factory Plant Development Department, S.E. London. Good openings for right applicants.—Apply, Box No. 2685, Electrical Times. (D 696)

SWITCHGEAR DRAUGHTSMEN are required by the English Electric Co., Ltd., in their Manchester drawing office. Only men with extensive metal-clad and diagram experience will be considered for these vacancies.—Write, giving details, age, experience, etc., quoting ref. 1128, to Department C.P.S., 336/7, Strand, W.C.2. (D 784)

TELEGRAPH CONSTRUCTION AND MAINTENANCE CO., LTD. require to appoint a TECHNICAL/SALES REPRESENTATIVE for north-east England. Applicants aged 30 to 45 years. Should be qualified electrical engineers with commercial ability.—Details of previous experience, qualifications and salary expected, to Staff Officer, Telcon Works, Greenwich, S.E.10. (D 755)

THE ASSOCIATED ETHYL CO. LTD., Northwich, Cheshire, wish to appoint to their Engineering Department staff an ASSISTANT ELECTRICAL ENGINEER. Applicants should be between 30 and 35 years of age, have had a recognised practical and theoretical training in electrical engineering, hold a university degree or have achieved Corporate Membership of the Institution of Electrical Engineers. Professional experience is required of not less than 10 years in the following fields of design, operation and maintenance, as practised in heavy chemical or petroleum processes.

(a) Industrial H.V. and L.V. distribution systems.
(b) Power and lighting installations.
(c) Medium-voltage heavy-current electrolytic processes.

The successful applicant will be based ultimately at the company's works, now nearing completion at Ellesmere Port, but initially the duties will be carried out from Northwich.—Applications, stating age, education, qualifications, experience and salary required, should be sent to the Personnel Manager at the above address (D 774)

VICKERS-ARMSTRONGS LTD. (AIRCRAFT SECTION) have vacancies for TECHNICAL AUTHORS with electrical and radio experience, for compilation of aircraft manuals—both military and civil. Apply to Employment Manager, Vickers-Armstrongs Ltd. (Aircraft Section), Weybridge, Surrey.

Applications, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. (D 739)

THE RIO DE JANEIRO TRAMWAY, LIGHT AND POWER CO., LTD., a British Company in Brazil, invite applications from suitably qualified men for the post of ASSISTANT SUPERINTENDENT at their Ilha Plant, situated 200 km from Rio de Janeiro in healthy climate. Candidates of good education (single, or if married, preferably without children) should be between 30 and 40 years of age, with at least 5 years' experience in hydro plants and should have a sound fundamental knowledge of electricity and mechanics. The successful candidate will be required to assist the Plant Superintendent in his various duties in connection with the operation and maintenance of a low head hydro plant consisting of 5 Francis type units with a total capacity of 167,000 kW. Good salary plus furnished house; three-year agreement subject to renewal with first class passage both ways; four months' leave after three years' service; superannuation scheme.—Written application, which will be treated in strict confidence, should be made to Mr. W. P. Kellett, Joint Manager, Canadian-Brazilian Services, Ltd., 146 Leadenhall Street, London E.C.3. Applications should be received by June 12, 1953. (D 738)

WORK WANTED

A.C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 15)

ARMATURE REWINDING service to the trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors. Vacuum cleaner and drill armatures replaced from stock. 24-hour service. Every job guaranteed. All vacuum cleaner parts, hoses, etc., in stock for any make. Apex washer agitator shafts stocked.—Regam Electric Cleaner Service, 95 Park Lane, Leeds 1. (D 637)

BURNT OUT fluorescent tubes RECONDITIONED.—E. J. Dawes, Ltd., Erimus Works, Stockton Street, Middlesbrough. (D 756)

FISHER FOUNDRIES, LTD., Greet, Birmingham, have immediate capacity for machine moulded PRECISION CASTINGS in gunmetal and grey iron, ¼ to 30 lb. All castings shot blasted.—Telephone: Birmingham, Victoria 0197. (D 21)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (D 36)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (D 9)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (D 5)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (D 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water tube boilers for dismantling.—Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (D 2)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (D 7)

FOR SALE

CABLES & WIRE

REDUNDANT stocks of bare, insulated and enamelled COPPER WIRE.—Offers to Box No. 2649, Electrical Times. (D 645)

DOMESTIC APPLIANCES

GRUBB IMMERSION HEATERS. No purchase tax on the 7 kW models. Provision for usual domestic loadings as required. All sizes 16 in. to 30 in. Immediate delivery.—For particulars and trade terms write distributors, John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (D 479)

ENGINEERING PLANT & MATERIALS

STAINLESS STEEL BAR, 18/8 quality, 2 in. to 3 in. dia., approx. 2 tons available.—Hughes, Duff & Co., 47 Rosebank Road, Hanwell, London W.7. Ealing 0164. (D 777)

GENERATING PLANT

STEAM-DRIVEN GENERATING SETS. 250-kW turbo GENERATOR SET by W. H. ALLEN/MATHER AND PLATT, for 220/230 V d.c. Steam pressure 150 lb. exhausting against 5 lb back pressure. Speed 6,000-650 r.p.m. through reduction gear.

250-kW geared turbo GENERATOR SET by BELLISS AND MORCOM/CROMPTON PARKINSON, for 207-230 V d.c. Speed 1,000 r.p.m. through reduction gear. Multi-stage turbine designed for steam at 290 lb, 550° F superheat, plus 25% overload for two hours when running at 6,000 r.p.m.

Two 187½-kVA steam-driven ALTERNATOR SETS by BROWETT LINDLEY/BRUCE PEEBLES, for 400/3/50, 4 wire. Speed 428 r.p.m. Designed for use with steam at 200 lb exhausting against 10 lb back pressure, utilising steam superheated 150°.

150-kVA steam-driven ALTERNATOR SET by BROWETT LINDLEY/INTERNATIONALE D'ELECTRICITE, for 400/3/50, speed 375 r.p.m. Steam pressure 120-140 lb. Superheat 100° F exhausting to atmosphere.

73-kVA steam-driven ALTERNATOR SET by BELLISS AND MORCOM/L.D.M., for 440/3/50. Steam pressure 140 lb condensing. Alternatively 155 lb W.P., 100° superheat, 10 lb back pressure.

60-kW steam-driven GENERATING SET by W. H. ALLEN, for 225-230 V, d.c. Speed 500 r.p.m. Steam pressure 170 lb.

15·75 kW steam engine driven set by HINDLEY/E.C.C., for 225 V, d.c., 70 amps. Speed 650 r.p.m. Steam pressure 100 lb sq in.

George Cohen, Sons and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070. And Stanningley, nr. Leeds. Tel.: Pudsey 2241. (D 788)

LIGHTING EQUIPMENT

FLOODLIGHTS, 15 in. 2/300 W, weatherproof, reasonable price.—Tel. Hoddesdon 3317 or write Box No. 2681, Electrical Times. (D 789)

PURLEY CHOKES AND BALLASTS. Our 80 W tapped h.p.f. ballast, with starter switchgear-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard, Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9. (D 16)

METERS

A.C./D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, London N.W.4. (D 6)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (D 11)

MOTORS & STARTERS

A.A. ELECTRICAL CO. for A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Chiswick 5605, 67 Rothschild Road, W.4. (D 8)

All types and sizes of

Industrial Electrical Equipment

ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London, N.W.9
Telephone: COLindale 4621/2. (D 14p)

"DIFFICULT TO GET!"

Unusual motors and electrical gear, or quick delivery of standard machines, then contact:—

SUPER POWER LTD.

Stockists of geared and flameproof motors by well-known manufacturers.

81 NORTH SIDE, CLAPHAM COMMON, S.W.4.
Tel.: BATtersea 3355 (3 lines) (D 586p)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2273-9.) (D 4)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (D 10)

FOR SALE. One protected type Slip Ring INDUCTION MOTOR of B.T.H. manufacture. 3,000 V 3-ph. 50 c/s, 550 h.p., 209 r.p.m. Complete with bedplate. Rotor and stator completely rewound and motor thoroughly overhauled by B.T.H.—Box No. 2661, Electrical Times. (D 687)

MARTIN'S armature and field winder in one unit is the perfect answer to winding your own small motors.—Arrow Works, 147 Camden Road, Tunbridge Wells. (D 715)

25-H.P., 960-rev. slipring MOTOR, Laurence Scott; Allen West oil starter.—Offers to John Williams Ltd., Desborough Park Road, High Wycombe, Bucks. (D 778)

SWITCHGEAR

MERCURY SWITCHES are made by Hall, Drysdale and Co., Ltd., of 53 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (D 12)

TIME SWITCHES for sale. Reconditioned or new. 12 months guarantee. Immediate delivery.—Lists from J. W. Hughes, 3 St. Thomas' Street, London Bridge, S.E.1. (Tel.: Hop. 2759). (D 561)

TRANSFORMERS & CONVERTERS

CURRENT-TRANSFORMERS, ring type, 100-300 amps. Delivery ex stock.—Hurst Electrical Industries Ltd., 75a Well Street, London E.9. Amherst 4166. (D 439)

UNCLASSIFIED

A HIGH VACUUM IMPREGNATION UNIT, to B.I.C. Specification 214 or individual requirements. Good delivery at competitive prices from Vactite Components and Assemblies, 505 Lordship Lane, S.E.22. Forest Hill 7089. (D 302)

SURPLUS to requirements owing to construction modifications. ELECTRIC MOTORS, DISTRIBUTION BOARDS, PLUGS, FLUORESCENT FITTINGS, CABLE, CONDUIT, and all types of fittings. Suitable for contract work.—Apply Box No. 2671, Electrical Times. (D 724)

MISCELLANEOUS

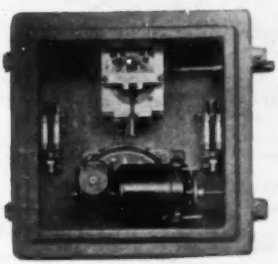
CITY AND GUILDS (Electrical, etc.) on "No Pass—No Fee" terms. Over 85 per cent. successes.—For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook, FREE and post free.—B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (D 19)

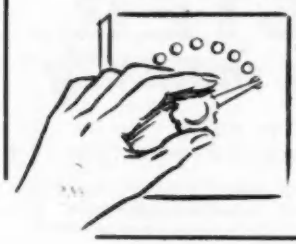
FREE! Brochure giving details of courses in ELECTRICAL ENGINEERING and ELECTRONICS, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College, operated by an Industrial Organisation. Moderate fees.—E.M.I. Institutes, Postal Division, Dept. ET.29, 43 Grove Park Road, London W.4 (Associate of H.M.V.). (D 20)

THE PROPRIETOR of British Patent No. 617091 for "IMPROVEMENTS IN OR RELATING TO POLY-PHASE VALVE GENERATORS," desires to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder.—Further particulars may be obtained from Marks and Clerk, 57-58 Lincoln's Inn Fields, London W.C.2. (D 757)

COXPAR *AUTOMATIC VOLTAGE* ***REGULATOR***

- Suitable for large A.C. or D.C. machines.
- Possesses extreme sensitivity.
- Accuracy to within ± 1%.
- Electrical interlocks and limit switches provided.
- Full balancing gives stability under mobile conditions.
- Simple to install and to put into operation.
- Maintenance negligible.





As specialists in the field we shall be pleased to advise on the question of automatic voltage regulation if we may receive particulars of your specific requirements for any loading.

COX WALKERS LTD.
NORTH EASTERN ELECTRIC WORKS
Established 1880 **DARLINGTON** *Phone 2387*

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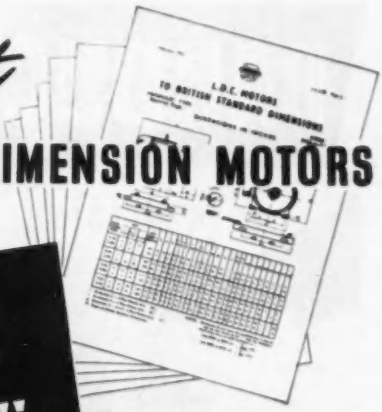

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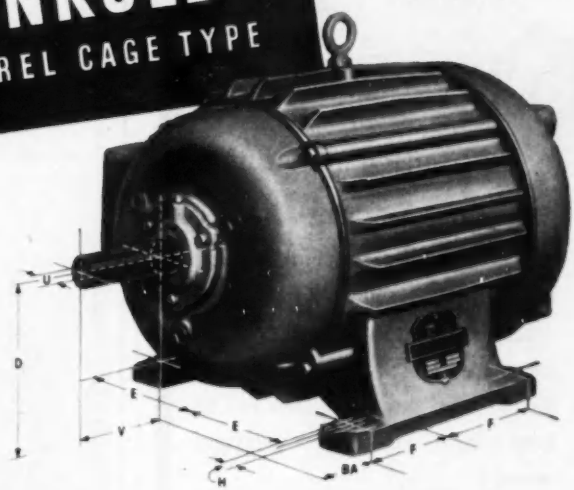

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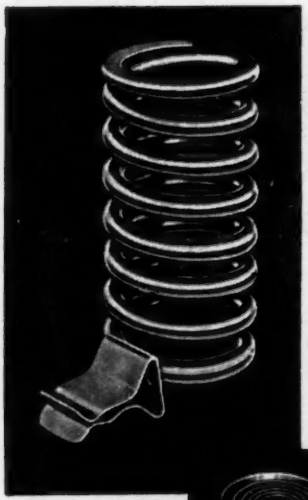

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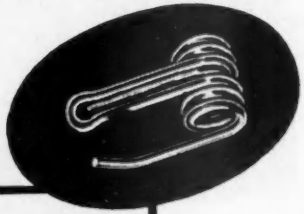

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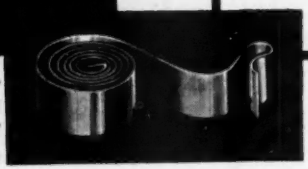

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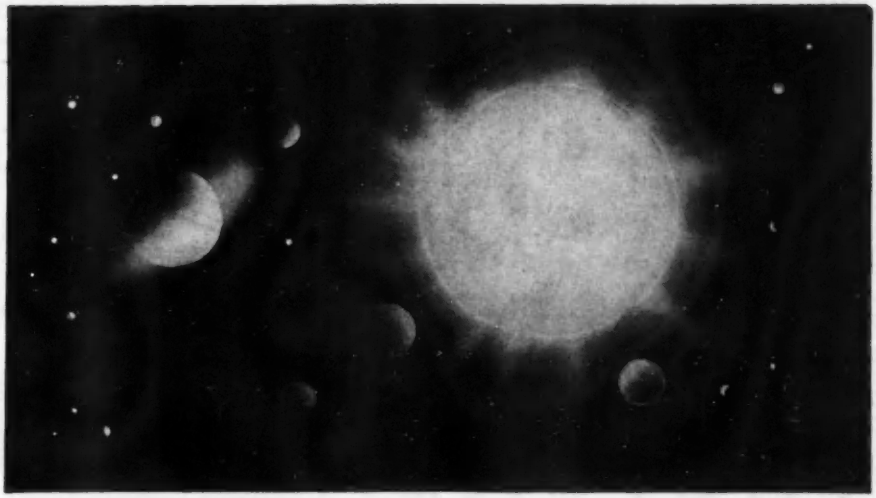

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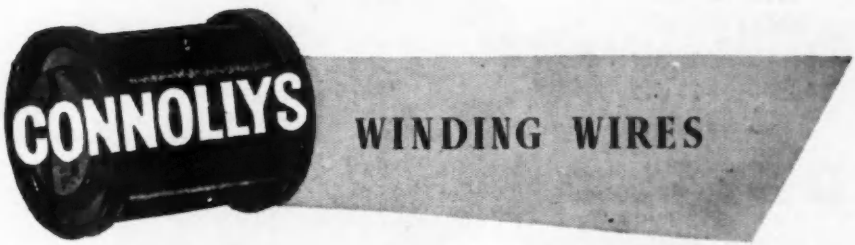

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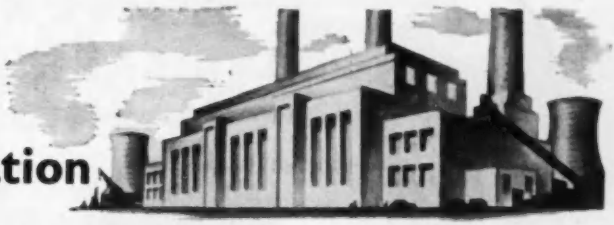

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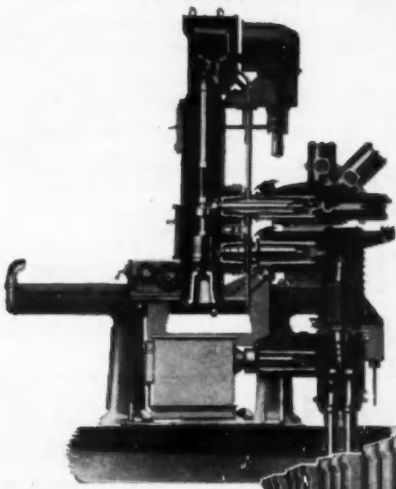

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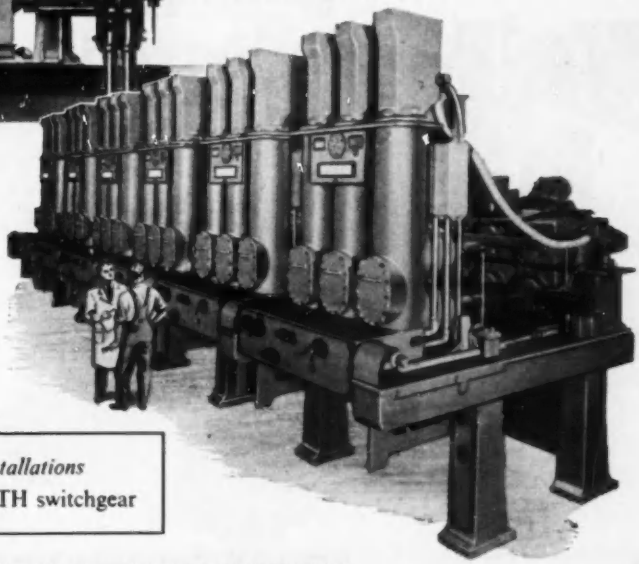

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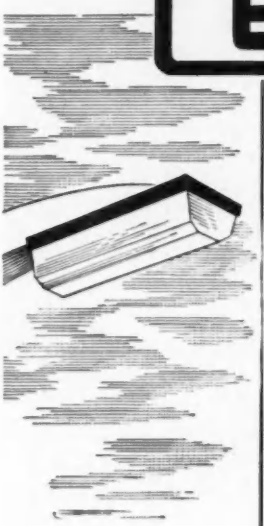

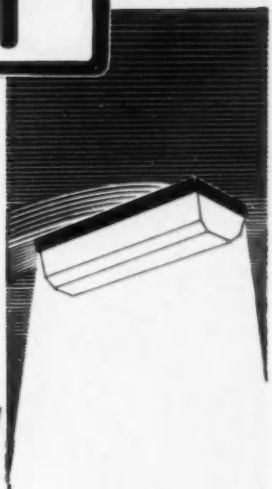

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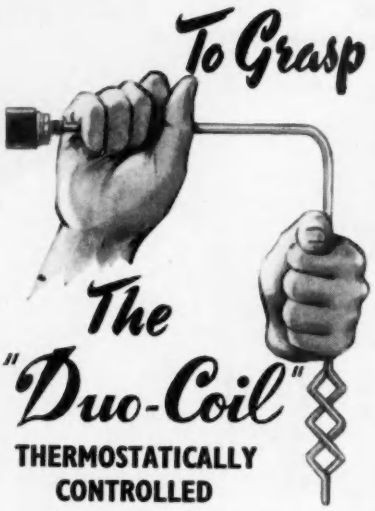

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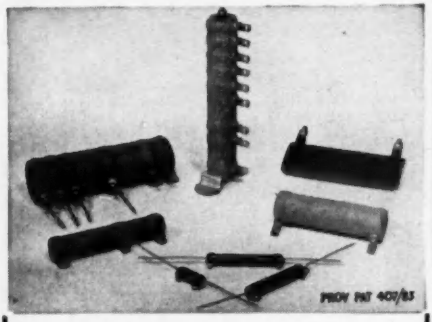

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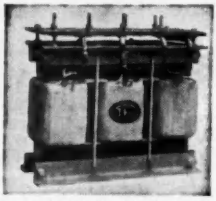

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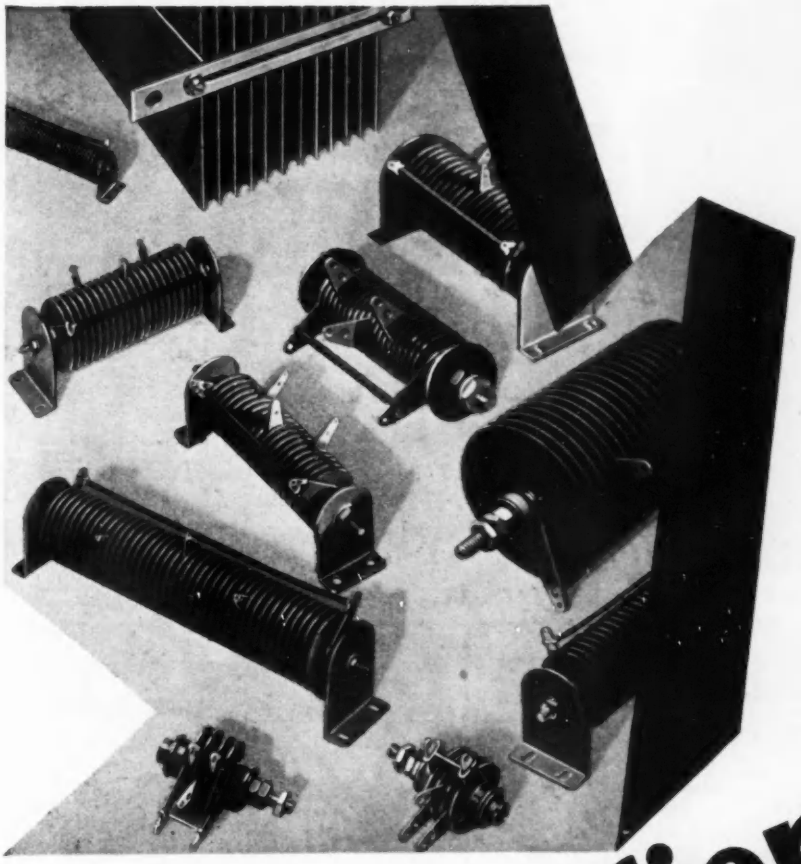

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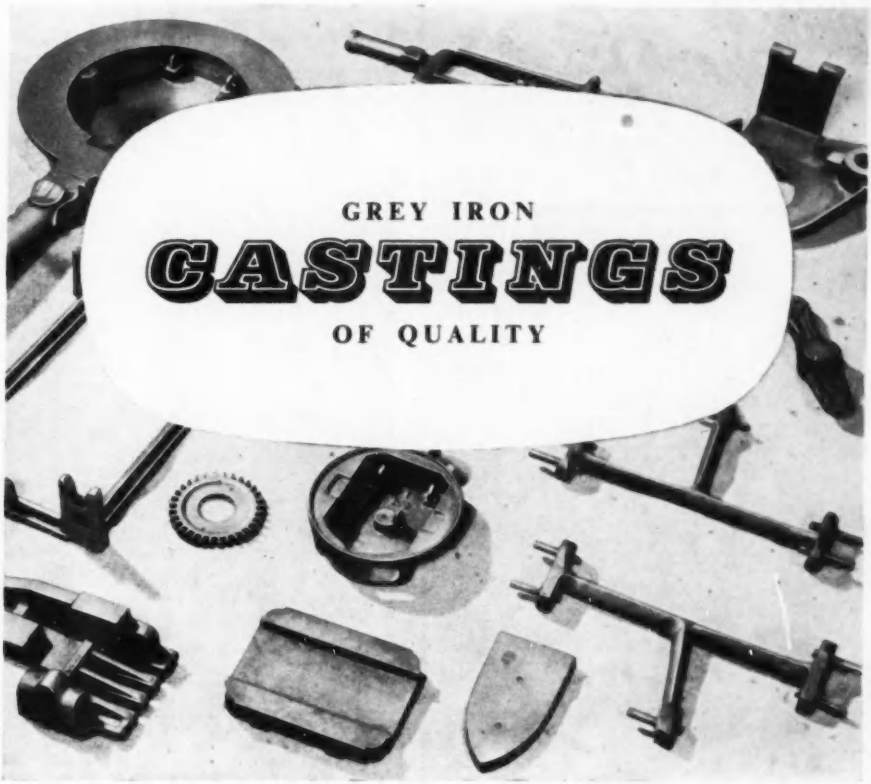

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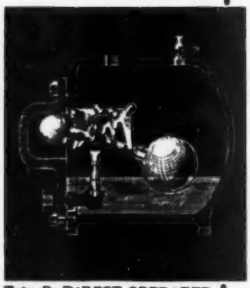

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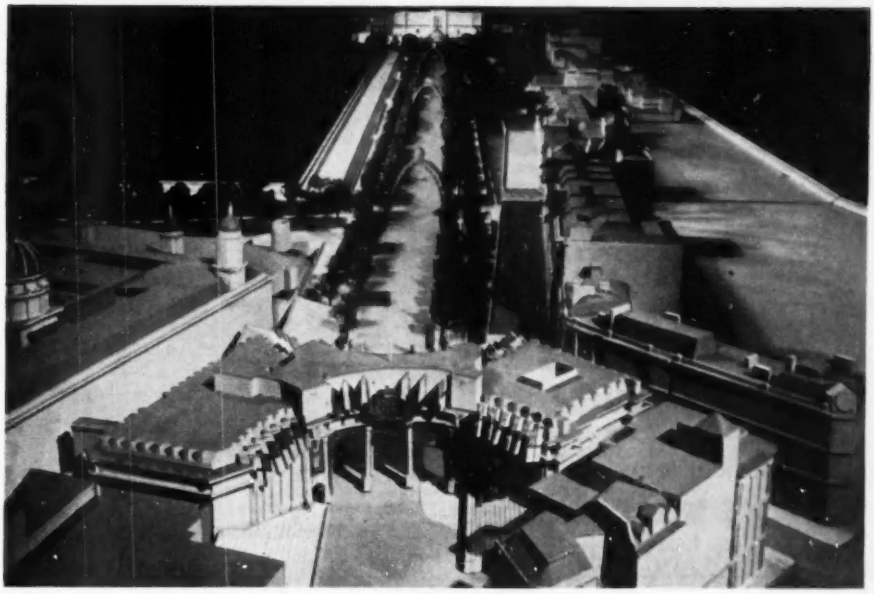

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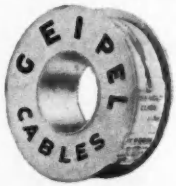

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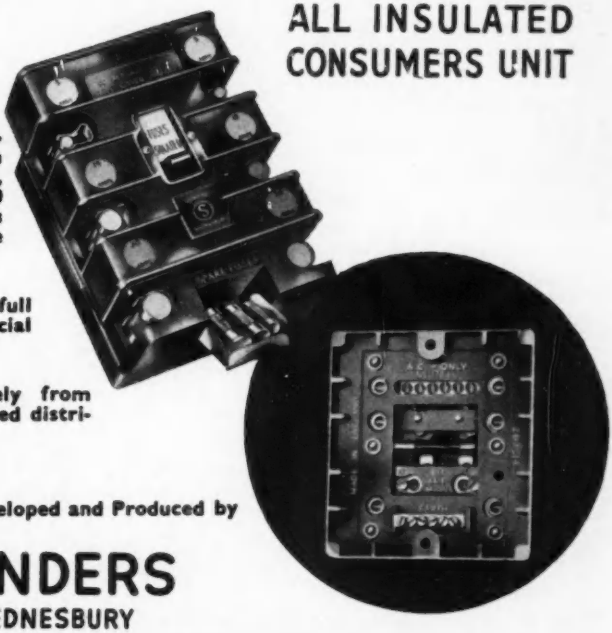

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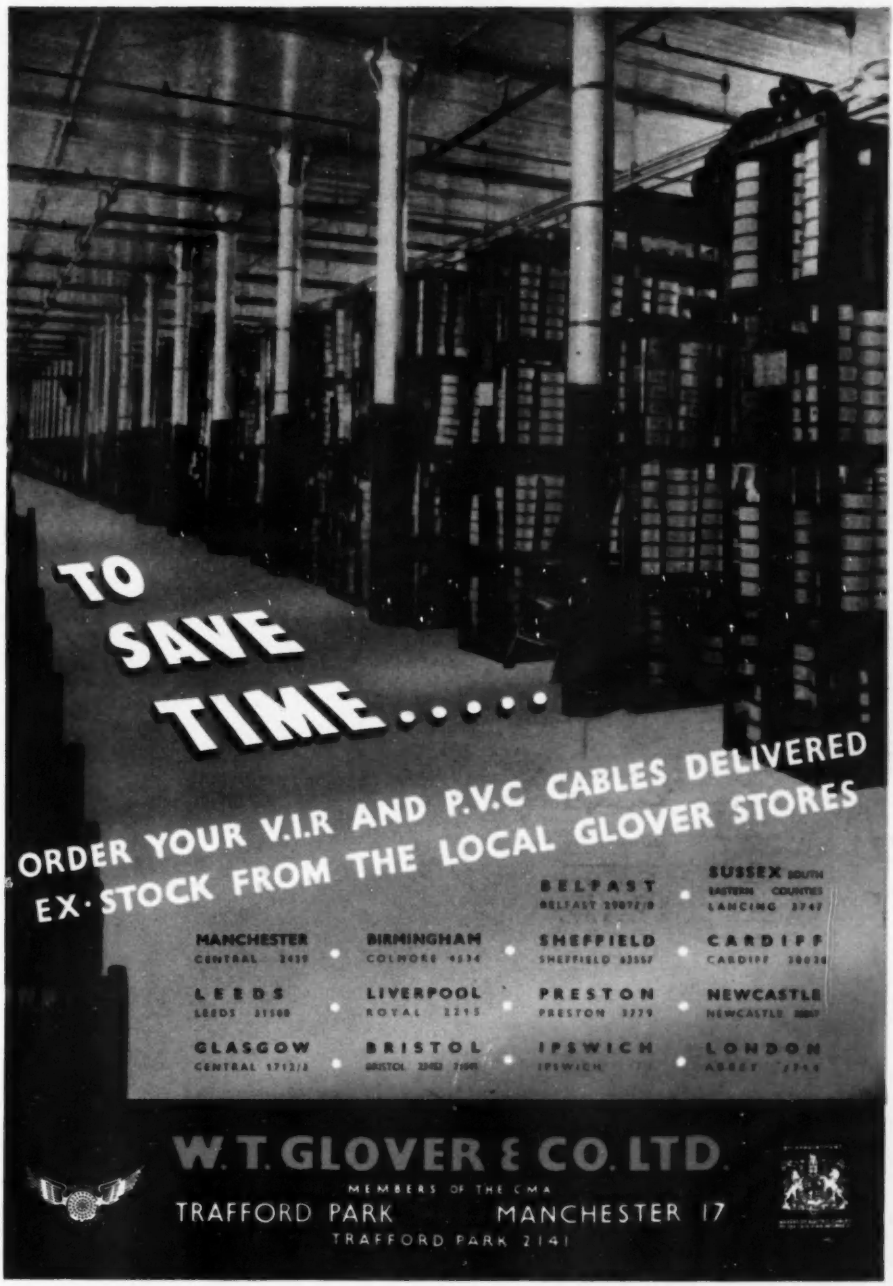
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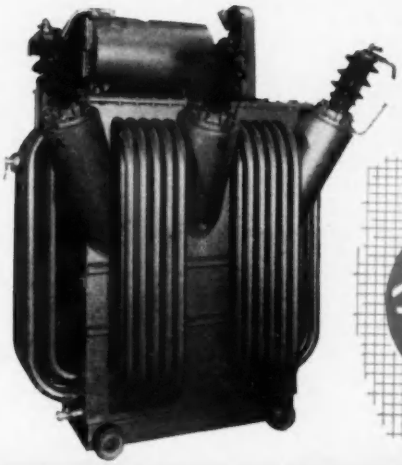

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